FOOD
MANUFACTURE

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FOOD MANUFACTURE

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Better Farming will Ease Food Shortage

COUNTRIES both east and west of the Iron Curtain will unite this autumn in a joint attempt to break the vicious circle in which food shortages have been directly responsible for reduced industrial production throughout Europe, particularly in the coal-mines. Conversely, agriculture has everywhere been prevented from achieving its maximum output because of the lack of tractors, farm implements and machinery, insecticides, fertilisers, and other equipment produced by industry.

To meet this situation, experts from thirteen countries met in Geneva on September 8 in a new effort to raise Europe's food supplies to pre-war level by boosting agriculture.

That shortage of foodstuffs was capable of holding back all economic recovery and was one of the more urgent problems of the moment was stressed by M. Gunnar Myrdal, executive chief of the United Nations Economic Commission for Europe, who added that agricultural output had failed to keep up with the eleven million increase in Europe's population since the war broke out.

Mr. Norriss E. Dodd, the new Director-General of FAO, said that there were no prospects for acreage increase in Europe, so that bigger output must come from better farming.

More intensive trade across the Iron Curtain, greatly increased foreign investment in agriculture, particularly in Eastern Europe, big increases in fertiliser production and in output and imports of tractors, and of feedingstuffs for livestock were included in the measures to increase agricultural output to be studied by the Commission. It was pointed out, however, that even if the present ambitious plans were fulfilled, two-fifths of Europe's population would be less well fed in 1950 than before the war.

Bacteria and Frozen Vegetables

While there have been numerous reports on the effect of freezing on pathogenic and food spoilage organisms associated with frozen foods, little attention has been paid to the effect of rate of freezing on the microbial content of such products. Further investigation of this matter has been carried out by W. P. van Eseltine, Lois F. Nellis, F. A. Lee, and G. J. Hucker of the Division of Food Science and Technology of the New York State Agricultural Experiment Station (*Food Research*, **13**, 4, 1948).

Peas and sweet corn were the two products selected for this purpose, and on arrival at the laboratory the peas were washed, blanched in rapidly boiling water for one minute, cooled in cold water, drained, mixed thoroughly, and packaged in pint containers. The corn was husked, blanched in rapidly boiling water for seven and a half minutes, cooled for an equal period in cold sprays and cold water, cut from the cob, thoroughly mixed, and packaged in the same manner as the peas.

Samples of each were taken for bacteriological analysis at the start of the experiment, after freezing in liquid air, and at various intervals during freezing at the slower rates. Treatment at 0° F. with the samples packed in insulated boxes resulted in a very slow rate of freezing with considerable multiplication of organisms. After fifteen to twenty-five hours the temperature reached 32° F., growth ceased, and the ordeal of freezing again reduced the bacterial content.

Freezing in liquid air and in an air blast at −60° F. resulted in such quick freezing that the bacterial count of the foods was essentially unchanged. A practical method from a bacteriological standpoint was found to be freezing in still air at 0° F.

It is essential to package the blanched food and place it in the freezer as quickly as possible to prevent bacterial growth on the food; and the freezer must not be packed too full, as this will result in too slow freezing of the packages in the centre of the stack and bacterial multiplication can be expected to occur.

In these experiments the final counts, after freezing at the several different rates, were not widely different, indicating that the rate of freezing in farm or home freezers may be sufficient for the production of frozen foods of good quality.

Reciprocation—not Restrictions

A little more reciprocation and a little less restriction in the baking industry was the plea put forth by Mr. J. Valentine Backes, A.R.C.Sc., A.R.I.C., D.I.C., in his address at the annual dinner of the Essex Federation of Master Bakers.

In hoping that his wish of prosperity to the Federation would have a chance of fulfilment in the maintenance of private enterprise in the baking industry, Mr. Backes spoke of their wonderful record, which had contributed much to the uplift of the industry. Future prosperity would depend in no small measure on the industry's ability to create demand, and to this end he welcomed the inauguration of the British Baking Industries' Research Association. He also mentioned a Research Association which he had recently inaugurated for the manufacturers of bakers' prepared materials, to enable those in the allied trades to assist bakers in the effort to create demand to ensure that whatever surplus there was in the wage packet of the worker would find its way into the industry rather than to others who would put up an attractive fight. Mr. Backes stressed the need for unity of purpose between the baker, the flour confectioner, the allied trader, the technical schools, the research associations, and the Ministry of Food and other legislative bodies. The great future ahead of the industry predicted by Mr. Backes will depend in no small measure on the wisdom of the associations and the integrity of their members.

Plant Nutrients and Vitamin C

That vitamin C in citrus fruits tends to fall as the nitrogen supply of fertiliser or manure treatments increases, has been established in America and the West Indies, and Joan Bryan and Dr. A. Pollard of Long Ashton have now shown that it also seems true of blackcurrants.

The Mendip and Cotswold Cross varieties, grown on field plots laid down to study various manurial and fertiliser treatments, were studied for vitamin C content during 1946 and 1947. The treatments were: stable manure, naturally dried sewage sludge, a straw-sludge compost, a straw compost made with "nitro-chalk," a fertiliser treatment of inorganic kind, meat and bone meal, a town refuse compost, and a control with no treatment. All plots were adequately supplied with potash so that the principal differences were supply of nitrogen (including both quantity and availability factors), possibly the supply of phosphates, and the organic *v.* inorganic influence.

In general, the highest vitamin C contents were registered by the "no-treatment" plots, and the inorganic fertiliser plots, with their rapidly available nitrogen supply, gave the lowest contents. In comparing a good many of the plots, however, differences were not big enough to be regarded as truly significant; though, if this statistical safeguard is ignored, the variations certainly show a clear-cut tendency for vitamin C contents to fall as the nitrogen status of soil treatment rises.

When the leaf content of nitrogen was plotted against the ascorbic acid content of the fruit, five out of six points for Cotswold Cross blackcurrants fell in a straight line with a gradient clearly showing that increased nitrogen meant reduced vitamin C content. It is pointed out that these experiments form only a preliminary investigation. Also, that the variations in vitamin C are only of qualitative significance. The larger nitrogen supplies gave larger crops, so that, despite the reductions in vitamin C, the total vitamin production was greatest for the higher nitrogen plots. This also agrees with findings for citrus fruits in America and the West Indies.

Vitamin K_5 as a Food Preservative

In some work reported to the Division of Agricultural and Food Chemistry of the American Chemical Society, Robertson Pratt, Peter P. T. Sah, Jean Dufrenoy, and Virginia L. Pickering, of the University of California, state that vitamin K_5 (2-methyl-4-amino-1 naphthol hydrochloride) at a concentration of 0·1 g. per litre prevents growth of *Penicillium notatum* on a rich culture medium. Growth of *Trichophyton mentagrophytes* was prevented by K_5 at a concentration of 10 g. per litre in agar cup-plate tests, or by 0·01 g. per litre when the compound was incorporated in the nutrient substratum. The compound is strongly antagonistic also to *Microsporium canis*, *M. audonini*, and *Botrytis allii*. Concentrations of 25 mg. or more K_5 per litre checked fermentation by yeast (*Saccharomyces cerevisiae*) in a 10 per cent. glucose solution.

The authors state the results in terms of altered redox potentials.

The antifungal and antifermentation properties of vitamin K_5 and its low toxicity suggest potential usefulness in clinical treatment of dermatomycoses and as a preservative in the food and beverage industries.

Spray Residues and Canning

Joint work at Long Ashton and Campden on the effects of certain fungicide spray residues upon canned blackcurrants has been described in the new Long Ashton Annual Report (1947).

Blackcurrant leaf-spot is a fungus disease which results in serious defoliation, but it can be controlled by modern fungicides of the thiocarbamate class. There is, however, a residue of about 45 p.p.m. left on the fruit. This residue can be regarded as a relatively constant effect unreduced by time or weathering influences. A boiling or pulping treatment of the fruit before canning decomposed the residue, but canning in syrup leaves a final trace of spray in the product of about 15 p.p.m. The effect of this small residue is serious. It accelerates the development of hydrogen swells in the cans and also produces a marked and objectionable flavour. In early experiments both ferric dimethyldithiocarbamate and tetramethylthiuram disulphide controlled the fungus disease satisfactorily, but the treatments made the fruit unsuitable for ordinary canning. The vitamin C content of both fresh and canned fruit was, however, unaffected.

The new experiments now reported tested eleven modern fungicides, not all of them in the thiocarbamate class. Fruit was picked at Long Ashton and canned at Campden the day after. After normal pasteurisation the cans were kept at 95° F. and compared for extent and rate of hydrogen swell formation.

In both the 1946 and 1947 tests thiocarbamate sprays—the two already mentioned and zincate and Dithane—gave the best control over leaf-spot, but they were equally superior in causing the fastest rates of can loss by hydrogen swell formation. Some of the other sprays in 1946 gave poorer disease control, but their residues did not cause greater losses of cans than in the unsprayed controls. However, in the 1947 experiments two new organic fungicides not containing sulphur gave control of leaf-spot which was almost as efficient as that of Dithane (disodium ethylene bis-dithio-carbamate hexahydrate). These were heptadecyl glyoxalidine and dichlornaphthaquinone (Phygon); indeed, these two sprays were actually superior to two other thiocarbamates. When it came to the canning tests one of these non-sulphur sprays, heptadecyl glyoxalidine, showed no significant difference in rate of swell formation from the control cans; the other non-sulphur spray was better than thiocarbamates for rate of swell formation but still compared very unfavourably with the controls.

Although the impossibility of using organic sulphur fungicides for fruit to be canned whole has been confirmed in this work, the finding of an effective spray of the organic but non-sulphur class is a promising development. Indeed, this result should be of wide significance, and of possible application wherever fruit is canned in syrup, and where the fruit plantations are liable to fungus-type diseases.

Rod and Rule

Members of the fishing industry are not very pleased with Statutory Instrument No. 1480. Under this Order no fish must be taken under the following sizes: cod, 12 in.; hake, 12 in.; sole, 9½ in.; whiting, 8 in.; haddock, 11 in.; plaice, 10 in.; lemon sole, 10 in.; turbot, 12 in.; and dabs, 8 in. Apparently the way the fisherman is going to control this business is by using a measure. The idea of hauling in his lines combined with a measuring operation would be intriguing to the motion study expert.

Recently we were having a chat with a chap who was a harpooner on a whale factory ship. He was telling us that he was not allowed to shoot a whale under a specified length, and we asked him how he was able to measure the animal when he was shooting at it from a mile or so distant. The quality of his smile convinced us that he was not worried overmuch by an inch or so. However, it is a different kettle of fish in the case of the cod and other small fry, as the size of the *corpus delicti* may be checked at any time between its emergence from the water to its sojourn on the slab.

Photoelectricity in Food Processing

Although the principle of the photoelectric cell has been known for many years, the first papers on the subject being published so long ago as 1889, it was not until recently that its unique properties of converting light energy to electrical energy have been considered of value to the canning, glass packing, and freezing industries.

That the basic function of photoelectric equipment is not confined solely to counting is pointed out by Raymond Fancy of the Evanston R.F.

Corporation (*Food Packer*, **29**, 9, 1948). It may be used as a safety device to prevent the operation of machinery under certain conditions which would be hazardous to personnel, and where the use of mechanical guards around dangerous moving parts is not possible. A light beam, focused on a photoelectric cell and properly located, can reduce such a hazard to a minimum either by stopping the machine or by sounding a warning bell.

An interesting production problem was one which called for rapid rejection of improperly filled sealed cans. It was found that owing to the difference in the reflecting surfaces of empty or partially empty cans from those properly filled, a light beam when focused on these cans as they travelled along a conveyor would be reflected at different angles. By careful adjustment of the photoelectric equipment the improperly filled cans caused the operation of a mechanical device which rapidly rejected these cans.

Other obvious applications would be a photoelectrically operated valve for automatically controlling the flow of liquid when containers have been filled to a predetermined level, size sorting, automatic timing, and the synchronisation of mechanical operations.

Its speed and accuracy enable the photoelectric equipment to be used as a controlling agent in many cases where mechanical equipment alone would not be practical. Operated in conjunction with mechanical equipment, however, it may solve many manufacturing and food processing problems.

Eminent Fermentologist

Alfred Jørgensen, who died in 1925, would have been a hundred years old on October 16, 1948. In Denmark this anniversary was commemorated in gratitude for the work he did.

A friend of Emil Chr. Hansen, the Danish investigator, who carried out experiments on yeast diseases and on the basis of Pasteur's discoveries maintained the decisive importance of pure cultures with a view to obtaining a safe fermentation, Jørgensen was among the first to understand the importance of Hansen's work. When, in 1883, Hansen made the first brew with pure cultivated yeast in the Carlsberg Breweries, Jørgensen followed the same procedure at the Tuborg Breweries and, at Hansen's request, in the top-yeast Wiibroe Brewery at Elsinore.

Jørgensen devised a number of laboratory methods which are being used today and in a long series of publications and also in his textbooks, he communicated his discoveries on pure yeast. His studies on the variability of yeasts became a guide to the selection of important races of yeasts for industrial purposes.

His principal works are the textbooks *Micro-organisms and Fermentation* and *Practical Management of Pure Yeast*. The seventh and latest English edition of the former book was published this year.

Progress and the Columnist

So swiftly come new developments in a chemical industry having connexions with food and agricultural products or by-products, that while the chemist keeps abreast with difficulty, the layman lags far behind. Or perhaps if by layman we mean non-scientific writer, we should have said that he makes up in invention for any shortcomings in basic knowledge. The food technologist is all ears or eyes when he hears or reads how the Atlas Powder Company in a new 8 million dollar plant is now engaged in hydrogenating glucose to sorbitol in place of the older electrolytic reduction of glucose. For sorbitol is not only a humectant for tobacco (sufficient importance in these days!), for gelatine, and food wrapping papers, but is a source of ascorbic acid and may prove useful to diabetics. But when the technologist wishes to read a different version of the Du Pont conversion of oat-hulls and other agricultural residues into nylon—a version away from stern unromantic contribution in his own type of literature—let him try a "popular version" in the daily press rivalling that New York paper telling how Carrothers made nylon from "anti-freeze and castor oil."

"Still another blow at the smoker—and women to blame again, by Jove!" cries the columnist. "This time it's the humble corncob, so beloved by pipe-smoker Stanley Baldwin, that is threatened. It seems that chemically treated corncobs, like bran and other farm refuse, become furfurval (*sic*), and when you've got the stuff called furfuroal (*sic*) you are half-way to a pair of nylons. That's why huge furfuroal factories are popping up in America, the latest and largest at Niagara Falls. When scientists estimate that a bushel of corncobs shipped to Niagara is sufficient to grace 40 pairs of feminine legs, what chance has the pipe-smoker got?"

Though the columnist has not yet caught up with sorbitol, though nylon from oat-hulls is not yet on the move in Britain, he has at least a good beet-sugar harvest to be going on with, as it provides him with "the girl with a million pound look, having the sweetest job in the world—testing our beet harvest for sugar content!"

Mechanised Bread Making

It was in July, 1937, that Mr. Stanley Brookes and his son, Mr. W. J. Brookes, from Manchester, trading under the name of the Wonder Baking Co., Ltd., first opened their bakery on its present site in White Hart Lane. They brought to the enterprise a "key" personnel with wide experience in the trade, and their plan of operations included the production and wholesale distribution of sliced and wrapped bread, and a fully mechanised plant of the latest type.

AT the time of opening the bakery, a consumer-connexion in keeping with the enterprise had yet to be found, and empty vans were sent out to canvass for orders. Within a year, more than twenty vans were delivering bread, baked at the rate of 2,000 loaves per hour. Today, a fleet of 103 vehicles is needed to cope with an hourly output of 7,000 loaves, delivered to over 3,000 retailers within a ten-mile radius of the bakery. Baking proceeds on the three-shift schedule, and the building at Wood Green has twice had to be extended. Further expansion is allowed for by the acquisition of another bakery at Blackfriars, to be rebuilt and re-equipped as a branch of the company.

Planning the Building

The Wood Green premises were designed—in keeping with the directors' general plan—to afford the maximum sunlight, fresh air, and "free" inside space, enabling the operatives to work in a clean, well-ventilated atmosphere, conducive both to their general health and comfort, and to the production of a thoroughly hygienic food product.

In planning the building the gravity feed method of production has been featured. Production starts on the top floor, and each stage of the process is confined to one floor until the packing and despatch department at ground level is reached.

Blending and Sifting

From a delivery point at ground level, bagged flour (along with other materials) is hoisted by elevator to the top floor. Here, in the requisite proportions, it is weighed and tipped into a blender-sifter. The empty bags are treated by a cleaner before being returned to the mills. Residual matter from the cleaning process is converted into animal foodstuffs.

From the blender-sifter the flour travels on a chain-lift system to an overhead tube, through which it is carried to the automatic weighers. Handy to these are the tempering tanks, which

Blending different grades of flour.

regulate the temperature of the water used in the mix. The tanks are controlled by rototherm thermometers of the latest type.

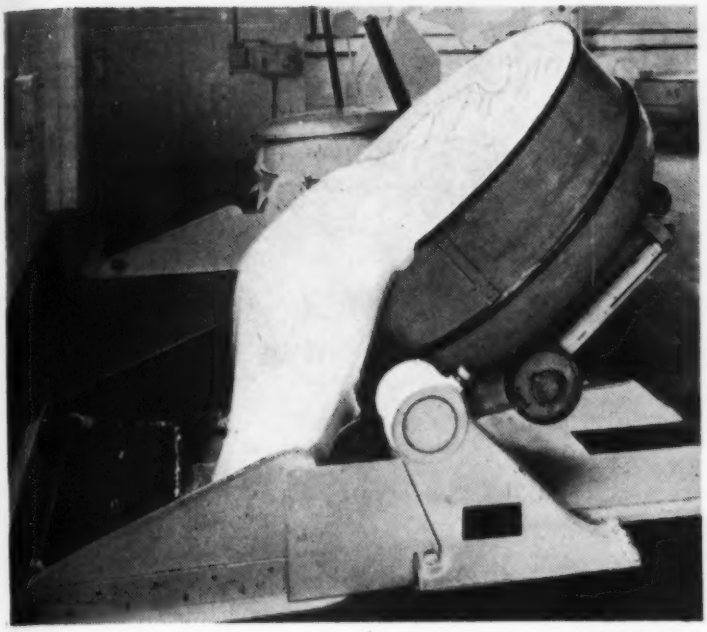
Fermentation Process

The weighed flour is then discharged into the mixing bowls, together with the necessary quantities of salt, water, and yeast, all automatically delivered. The bowls are then trundled, on their own wheels, to the kneading machines, where the mix undergoes the customary treatment and is then wheeled away for the set period of fermentation. After the dough has risen it is poured, by means of electric tippers, through a metal grid and down a chute to departments on the floor below. In this bakery the dough "flow" is continuous.

The mix now enters the dough dividers, where it is made up into small pieces, to be delivered two at a time into linen pockets on a conveyor belt. This takes it into the first prover, a warm chamber where the fermentation process is resumed, and the dough recovers some of its lightness lost in the "knocking back" it received while in the divider. From the first prover it enters the moulder, where it is rolled out, shaped, and then sent on its way to the final prover. During its sojourn in the provers the dough is under constant surveillance, and the rate at which it travels while in them is regulated by means of a 1·42 h.p. motor, fitted with variable speed gears.

As the dough pieces emerge from the final prover they are filled into greased baking tins, and the loaded tins move back on their conveyor-belt towards the entrance to the ovens, of which there are five. The ovens are gas-fired and of the travelling plate type. The tins of dough are conveyed along an endless belt of steel plating about $\frac{3}{8}$ in. thick, through baking chambers 60 feet long by 6 feet wide. Each chamber is fitted with five gas burners spaced along the side, each burner being controlled by its own temperature indicator and controller, allowing the temperature of the oven to be controlled in five zones. Two million cubic feet of gas per week is used for these ovens and other purposes, such as the canteen and the water-heating systems.

Automatic water measuring, tempering tanks, and dough mixing machines.



Tilting device for emptying dough out of the mixing bowls into the dividing and weighing machines on the floor below.

Into the Ovens and Out

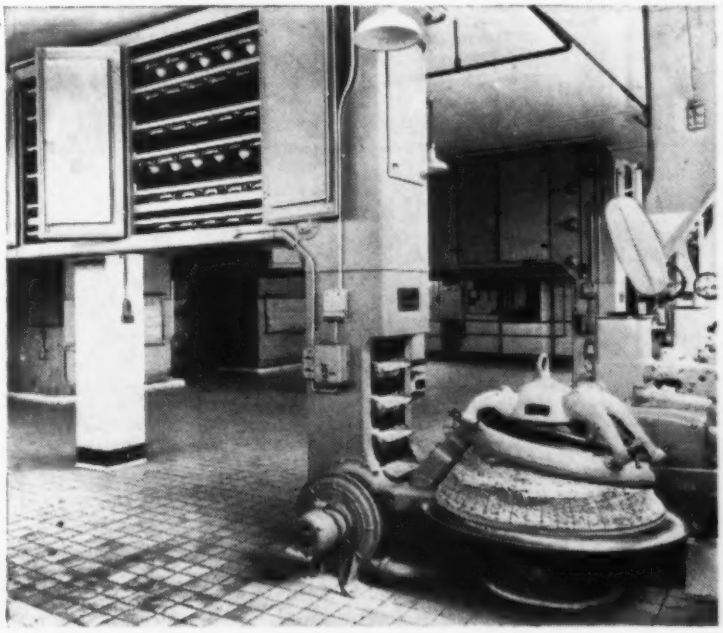
The first three ovens are built of brick, faced with glazed tiles. The fourth, although similar in other respects, has sheet steel casing, suitably insulated, instead of brick. Incorporated in the fifth is the "Cyclotherm" gas-heating system. Two burners, using a mixture of gas and air, supply the heat for this oven. Each has its own motor-driven fan for air induction, and the flame burns in a refractory brick-lined combustion chamber. The heat is drawn off into steel flow ducts, from which it passes for distribution through steel tubes located in the baking chamber. Return ducts collect and re-distribute some of the heated gases, which are re-used in conjunction with fresh ones from the burners, thus ensuring maximum fuel economy. Heat distribution in the other four ovens is on the steam tube principle.

From the ovens the emerging loaves are directed down chutes to the bread assembly department. At the same time the tins return by conveyor-belt for re-use, after treatment by a tin-greasing unit. This consists of a number of brush-heads on vertical rods worked by electric motors to give a two-way rotation. The tins are placed on top of the brushes and the standard vegetable oil mixture is forced into them by an automatic pumping system.

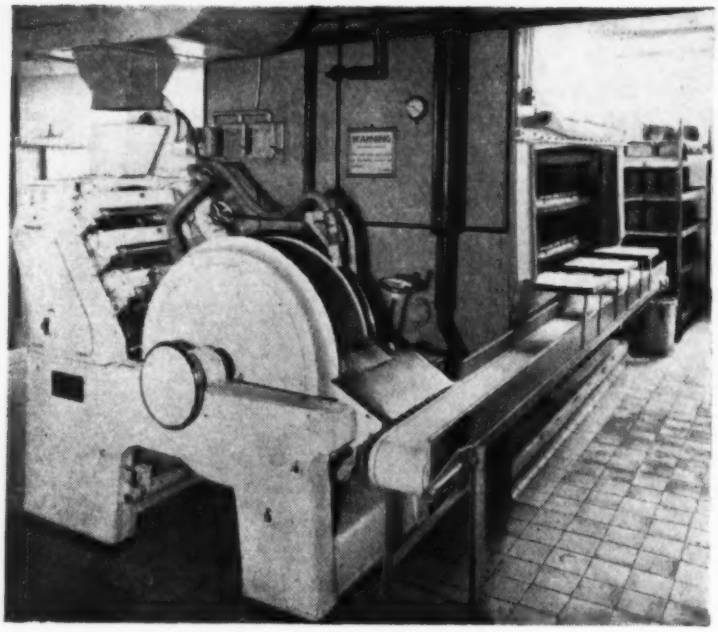
Every twenty-four hours 170,000 loaves, made from over 100 tons of flour, pass down the chutes to the despatch department, travelling in five continuous streams from the ovens. The bread is carried along on a slatted conveyor to the cooling racks, which have a capacity of 30,000 loaves, where it remains for four or five hours. The racks are constructed as seven-tray tiers mounted on trolleys.

The bakery commenced its operations by supplying the trade with loaves already sliced and wrapped, a process which consumed three tons of paper every week. This service, ensuring as it did a maximum of freshness and a minimum of wastage, made a name for the "Wonderloaf" in pre-war days. But although the wrapping is, for obvious reasons, no longer possible, the good name of the product has been well maintained.

Bread requiring to be sliced is taken from the cooling trays and placed on a small, gravity-fed



Dividing and weighing machines connected up with travelling, proving, and fermentation cabinets.



Automatic dough moulding machine, showing conveyor which carries the dough pieces into travelling, proving, and fermentation cabinets.

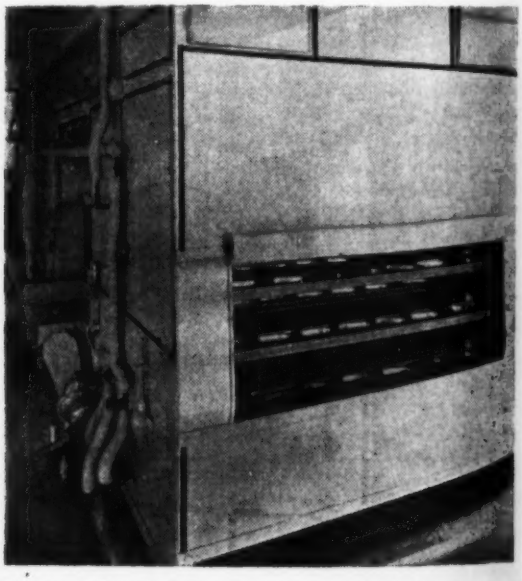
conveyor, which passes it under the blades of one of the five fully automatic bread-slicing machines. A machine, in other days, also did the wrapping. It goes next on wooden trays and into the waiting vans, backed up side by side in the loading bay. As these loaves, and the unsliced ones, travel along their respective conveyors, they pass under an automatic counter, which registers the tally. The loading is supervised by a batch foreman, who is responsible for the correct number of loaves in each van.

Transport Arrangements

Special attention is devoted to the efficient working of the delivery fleet. Each vehicle is fitted with a fog lamp, a rubber kick plate above the driver's step, and a folding tailboard to prevent children from jumping aboard while the vans are in motion. They are mostly pre-war 30 cwt. models, holding 1,600 loaves. Twenty-nine, however, are of a newer model, 2 to 3 tons, with a capacity of 2,800 loaves each. Four 10 to 12 cwt. vans deliver to the eight North London shops owned by the company.

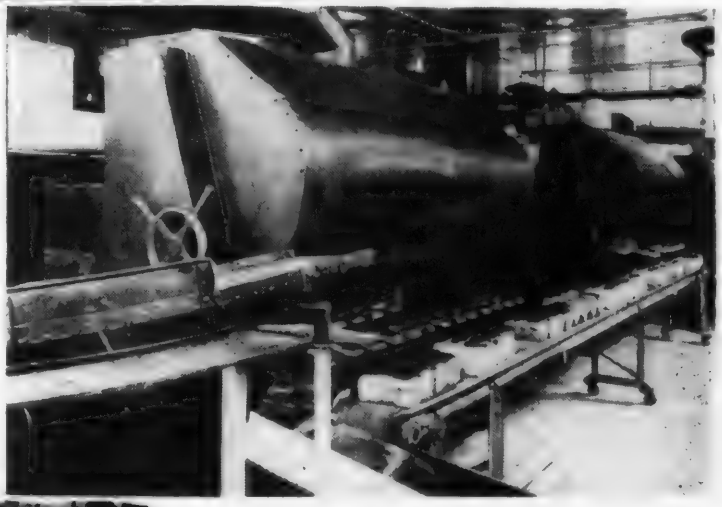
At the end of the day's run each van is washed thoroughly, inside and out, by a special cleaning squad. There is also a maintenance section, which

.The automatic tin greasing and cleaning machines.



The travelling final prover or fermentation cabinets.

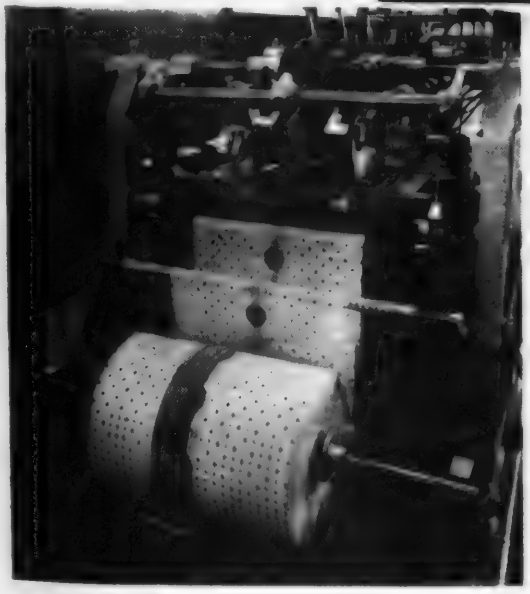
rectifies running faults immediately they are reported, while each vehicle undergoes a full-scale servicing every fourteen days. The driver, who has bread to handle, keeps his hands clean. He does no maintenance work whatsoever—and the vans are not even fitted with a spare wheel. In the event of a puncture, a 'phone call quickly brings a fitter on the scene to change the wheel. The drivers compete monthly for efficiency points, which entitle the winners to cash bonuses, and the privilege of driving one of the two special "Gold Star" vans



Above: One of the automatic gas-fired travelling plate ovens.

Right: Delivery end of two gas-fired travelling plate ovens, showing the bread being transferred from the ovens to the conveyor which carries the loaves to the despatch department.

Below: One of the slicing and wrapping machines, with a roll of wrapping paper attached.



for the ensuing month.

Both the "Gold Star" vans, with their smart red-and-gold colour scheme, and the ordinary ones, painted primrose and blue, are now familiar sights in North London. But the reputation of this bakery is spreading much further afield. The management extends the utmost courtesy to visiting parties, and lately these have included those from Holland, Italy, Canada, South Africa, and New Zealand.

Staff Welfare

A special cleaning and maintenance section is constantly at work freshening up the bright interior paintwork, removing dust, burnishing metal, and scrubbing the large expanse of bright white tiles. The operatives work in smart clean uniforms supplied, and kept freshly laundered, by the firm. At the conclusion of their shift they have access to well-appointed shower-rooms, themselves models of cleanliness with their tiled walls and floors, where a plentiful supply of hot water is constantly

on tap. Here they resume their own clothing, which in the meantime has been air-dried and stored neatly away in lockers. The firm take every precaution to safeguard their product from contamination, and so provide the public with a food that is absolutely pure. Wash-hand basins are provided adjacent to the lavatories, and tactful notices remind the staff concerning their use. All new employees are required to undergo an examination by a medical officer, who makes a routine visit to the bakery once every fortnight. A watchful eye is kept for any signs of infection, with particular regard to the skin, chest, and throat.

Medical Services

Under the charge of a full-time nurse, the first-aid post at this establishment is a model of its kind, and is equipped to deal with any likely form of accident. However, accidents at the bakery are rare, and are confined chiefly to minor burns. A rest-room is also provided for the convenience of the staff, while other amenities include a well-run canteen, open day and night, and a social club which functions actively on the usual lines.

Within the bakery "music while you work" is relayed through seventeen loudspeakers in all departments. In the loading bays, which are unavoidably draughty in winter-time, though roofed, of course, to keep both the bread and the workers dry, warmth is provided by five radiant heaters.

Of the 460 employees of the company, only 150 are engaged on the production side, and in the bakery itself the distribution of the sexes is practically equal. Most jobs are interchangeable, and are retained purely on the score of merit.

The bread is loaded direct on to the vans.

Glycerine and Food

A NEW approach to the production of compressed yet easily friable cereals and other foods has been made by I. A. Berg in U.S. Patent 2,437,150. He has found that both the desired firmness and friability of the food products may be obtained by incorporation, prior to compression, of a small quantity of glycerine. Not more than about ½ per cent. to 3 per cent. by weight of glycerine is required to obtain the desired results, the amount usually employed being approximately 1 per cent.

This small quantity of glycerine has a pronounced effect upon the ability of the food particles to adhere to each other and yet be separated when being prepared for use. The food masses are sufficiently firm to withstand the handling that is incidental to wrapping and packaging, yet sufficiently friable to permit easy crushing through pressure of the fingers or with a utensil such as a spoon, so as to be free from lumps and caked masses. The glycerine is applicable to various foods such as cereals, skim milk powder, chocolate beverage mixes, soup mixes, and potato meal. Unlike sugar syrup, glycerine allows compression to take place rapidly and conveniently, and the compressed masses are stripped readily from the dies without sticking.

Another use of glycerine is as a refrigerating mixture, which is particularly suitable for foodstuffs because it has no objectionable taste and is edible. Glycerine added to water lowers its freezing point and prevents hard freezing of the liquid at temperatures below that when ice starts to form. Such a mixture can be used either for immersion freezing of foods or for refrigerating coils and cold plates.

A complete account of this work has been published by Frank T. Gucker, Jr., and Glen A. Marsh (*Industrial and Engineering Chemistry*, Vol. 40, pp. 908-915, 1948). They give data covering a wide range of glycerine concentrations at a number of different temperatures. A comparison of propylene glycol with glycerine showed propylene glycol solutions to be only about 70 per cent. to 80 per cent. as efficient as the glycerine solutions.

SUPPLIERS OF EQUIPMENT TO THE WONDER BAKING CO., LTD.

Main plant: *Baker Perkins, Ltd.*
Flour sack elevator: *Spencer (Melksham), Ltd.*
Weighing machines: *W. and T. Avery, Ltd.*
Temperature indicators and controllers: *Bristol's Instrument Co., Ltd.*
Cooling equipment: *United Yeast Co.*, and *J. Crollie and Son, Ltd.*
Automatic counter: *Veeder-Root, Ltd.*
Bedford vans: *Vauxhall Motors, Ltd.*

Flash Freezing of Foods

The production of frozen foods using methods entirely different from those employed in other freezing processes is discussed in this article. By this process it is claimed that there is greater retention of flavour, colour, and vitamin C.

ONE of the latest methods for the freezing of food is by flash evaporating, in a high vacuum, a part of the moisture content of the food, with the result that the product differs from the conventional frozen food inasmuch as (1) it contains most of the original moisture; (2) it freezes in individual, separate pieces that are not stuck together in a matrix of ice; (3) its original volume is retained though there is a loss in weight due to evaporation. No de-frosting of the equipment is required, in contrast with the conventional freezing equipment.

When the food is subjected to high vacuum, water vapour is released at a low temperature, while the residual water contained in the product becomes frozen. To maintain the necessary reduced pressure, obviously the water vapour must be removed as fast as it is produced.

Application of Principle

Any device that can produce a high degree of vacuum and has a high volume capacity can theoretically be employed for flash freezing. Since the freezing is accomplished by flash evaporation of some of the water of the product, obviously no chemical refrigerant is needed and this obviates the need for the usual compressors, condensers, and all the equipment that goes with it.

One system, based on this principle, which produces qualitatively, as well as economically, satisfactory results is the "Freez-Vac" freezer. Direct evaporative freezing is produced by a high vacuum created by a steam-jet ejector system. The heart of the system is the steam-jet booster, which consists essentially of several steam nozzles discharging jets of steam at velocities of 3,500 feet to 4,250 feet per second across a suction chamber and through a Venturi-shaped compression tube. Water vapour from the freezer enters the booster, is entrained by the jets of steam, and is discharged through the throat and diffuser where the velocity or kinetic energy is converted into pressure. The mixture is thus compressed and discharged into the condenser at a relatively lower vacuum.

The proportion, size, and arrangement of the essential parts have an important effect on the capacity and compression range per pound of operating steam used. For efficient operation it is imperative that the condenser vacuum be as high as possible because, at the low pressure employed in the system, unless the condenser pressures are also low the efficiency of the operation would be inversely proportional to the resistance offered. Barometric type condensers are used, giving counter current direct contact of the cooling water with the booster exhaust. They are simple and non-clogging. The main condenser is served by a small two-stage ejector which discharges air to the atmosphere continuously.

Operating Cycle and Controls

The unit includes blanching and pre-cooling sections, a door opening into the freezing section and storage section, and a door opening to deliver the frozen product. After the load of prepared vegetables has been introduced into the unit, the operator presses a button and the loading door closes. From this point onwards the operations of blanching, pre-cooling, and freezing are carried out automatically by a co-ordinated control system. After the operator introduces the charge the cycle starts. Blanching steam is admitted and the "Timer waits" as indicated by the signal lamp.

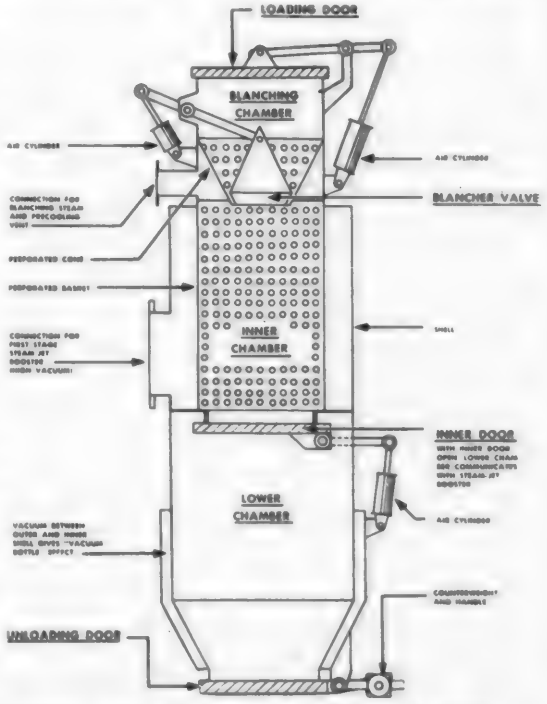
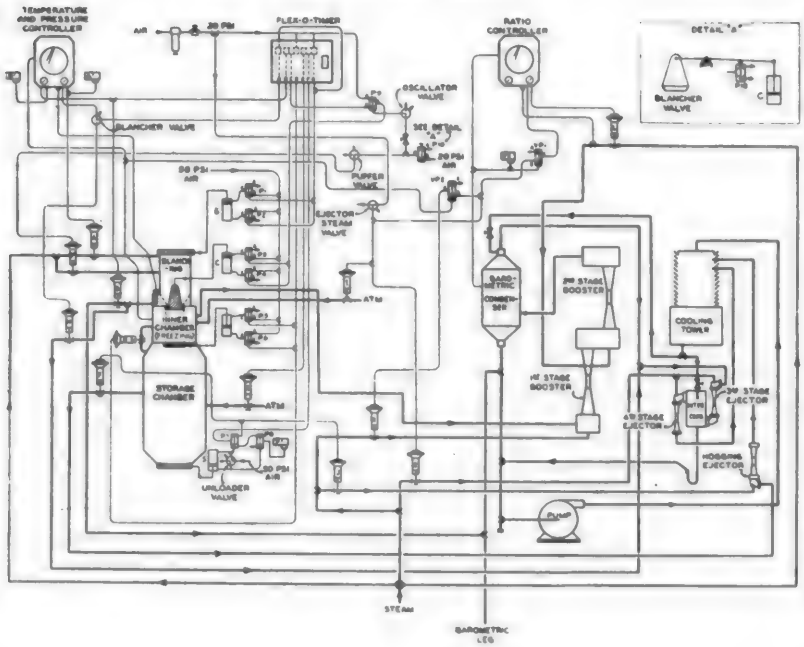


Diagram of the Ingersoll-Rand vacuum food freezer.

FLASH FREEZING CONTROL SYSTEM



At this point a temperature controller takes over, automatically bringing the product up to a predetermined temperature. Now the "Timer" resumes, maintaining the product, in conjunction with the temperature controller, at a given temperature for any predetermined period for which it has been set.

Completion of the Cycle

After the blanching operation is completed the blanching steam is shut off and the pre-cooling operation is begun. As the freezing operation begins, the loading door opens and the next charge is loaded for blanching. The loading door is now closed, and while the second charge is being blanched and pre-cooled the first charge is being frozen. The frozen charge is now dropped to the "lower" storage chamber, the second blanched and pre-cooled charge is dropped to the "freezing" inner chamber, and the loading door opens to receive the third load for blanching and pre-cooling. This completes the cycle and is repeated as a continuous operation. The "lower" storage chamber can hold four frozen charges.

While pre-cooling any charge, the vacuum can be broken in the "lower" storage chamber and the unloading door opened in order to remove and package the frozen product. As a safety feature, each time the loading door opens the "Timer waits" is on and the loading door will not close until the operator presses the starter button. On typical vegetables like peas, the time required for blanching, pre-cooling, and freezing is from seven to eight minutes.

Variations in the cycle of operation are almost unlimited. Time, temperature, operating sequence, and the inclusion or exclusion of a step can all be altered to suit particular requirements. For example, blanching can be eliminated, or, if a product needs only to be chilled instead of frozen, this can be done. In flash freezing the volume of the product is substantially unaffected. Peas, for instance, retain a smooth, bright appearance. No frost forms on the surface of the frozen foods, the absence of which permits pieces to freeze individually with no tendency to freeze or stick together. Oxidation does not occur because refrigeration takes place in the practical absence of oxygen and also because the blanched product is pre-cooled and frozen immediately after blanching without being exposed to atmosphere. Approximately 25 per cent. of the original weight is lost as water vapour during the flash freezing.

Steam blanching, used in flash freezing, causes less leaching of vitamins and the minerals than the conventional water blanching. The tendency to oxidative change in the foods is minimised due to the reduced amount of oxygen present during the steam blanching. Immediately after blanching and without exposing the food to the action of atmospheric oxygen, micro-organisms, and re-infection, the blanched food is pre-cooled by promptly applying the vacuum. This set of conditions produces a lower bacterial content product than that resulting with any other known commercial method. In addition, over-blanching is eliminated due to the promptness of pre-cooling and the complete elimination of the time lag between blanching and freezing. This results in the greater retention of flavour, colour, and vitamin C. Flash frozen foods should be stored at the usual storage temperature considered safe for ordinary frozen foods. The method has been proved economically sound and technologically capable of producing frozen products entirely different from those obtained by other freezing methods.

SUPPLIERS OF EQUIPMENT

"Freez-Vac": *Ingersoll-Rand.*
Co-ordinated Control System: *Short and Mason, Ltd.*

Malnutrition and Resistance to Infection

A paper presented by Professor J. R. Marrack, M.D., D.S.O., M.C., at the annual conference of the British Association for the Advancement of Science held in Brighton from September 8 to 15, 1948.

As a rule a fall of standard of nutrition is accompanied by overcrowding, exposure, dirt and fatigue, that are enough to account for any increase of disease; there is no clear evidence that malnutrition is a contributory cause. But, in a few instances, the standard of nutrition has fallen while the standard of life, in other respects, has not changed. A large amount of milk products was exported from Denmark to Germany during the early years of the first world war. The diet of the Danes suffered in consequence. As is well known, the incidence of keratomalacia rose steeply during these years; at the same time the T.B. death rate rose by over 25 per cent. After the end of 1917, owing to pressure by the British Government, the export of food to Germany was stopped and the food retained was eaten by the Danes. The T.B. death rate fell in the following year to the 1914 level, whereas in nearly every other country in Europe it rose above the 1917 level. There is no reason to suppose that the standard of living in Denmark fell up to 1917 and rose in 1918, except in respect of nutrition.

Professor J. R. Marrack, M.D., D.S.O., M.C.

Photo courtesy Elliott and Fry, Ltd.

Such instances seem clear enough, but there are puzzles. Why, for example, should the T.B. death rate in the British and American zones of Germany remain low in spite of undernutrition far worse than Denmark suffered in 1917? And there is evidence that malnutrition reduces the susceptibility of animals to certain diseases. We want to know more about the effect of nutrition on defences against diseases.

Vitamin A

Years ago Mellanby and Green suggested that vitamin A might be called the anti-infective vitamin; and the belief still persists that doses of vitamin A may protect against colds. When experimental animals are deprived of vitamin A the cells of some of the passages of the body—in the respiratory tract for example—change, and come to resemble the cells and outer layers of skin. With this change one of the important defences breaks down. The changed cells have no cilia to sweep bacteria that may get down into the smaller bronchioles up and out of the respiratory tract. Also the changed cells desquamate off and block the smaller air passages. Hence animals deprived of vitamin A are liable to bronchopneumonia.

How far this change of lining cells occurs in man is uncertain. We know that severe deficiency of vitamin A causes this change on the front surface of the eyes. A rather similar change may be found in the mouths of hair follicles, but whether this change is due to deficiency of vitamin A is disputed. It seems that no extensive investigations have been made into the frequency of this change in the respiratory tracts of human beings. When the morbid anatomist notes it he ascribes it to irritation or inflammation; the nutritionist ascribes it to deficiency of vitamin A. Children with congenital cystic disease of the pancreas have a limited ability to absorb vitamin A. They almost always die before they are five years old of infection of the lungs. The characteristic changes are found in their smaller air passages. The nutritionist holds that these changes are primary and that the inflammation is secondary to them; the morbid anatomist, that the changes are secondary to inflammation.

Certainly there is no evidence that people who have gone without vitamin A for long periods, by way of experiment, are abnormally liable to colds or other respiratory infections. In the longest known experiment, some of the subjects went without vitamin A for two years. Nor is the evidence that doses of vitamin A will reduce the incidence or severity of colds. But it is thought possible that lack of vitamin A may be one of the factors that reduces the resistance to tuberculosis. Vitamin A was the nutrient whose supply in Denmark fell most when the tuberculosis death-rate rose in the early war years and rose again when the death rate fell at the end of 1917. The lack of vitamin A was shown by the steep rise in the frequency of keratomalacia (which is undoubtedly due to deficiency of vitamin A) and the sudden fall in 1918. Some experimental evidence, that has not yet been published, also suggests that deficiency of vitamin A may make human beings more susceptible to tuberculosis.

Formation of Antibodies

Antibodies are proteins and can be made only from proteins of the food or of the body. It seems reasonable that when the food supplies too little protein for any length of time, the formation of antibodies should fail and resistance to disease be impaired in consequence.

In immunology it is traditional for investigations to develop into controversies between two schools. In this case one school has been led by Cannon, who attaches great importance to deficiency of protein and consequent failure to form antibodies in lowering resistance to disease. He and his colleagues have kept rabbits and rats for long periods on diets that supplied very little protein, and have found that these animals have formed less antibodies than were formed by control animals in response to injections of bacteria and other substances; also that animals recovered their ability to form antibodies when they were given more protein.

Cannon's theory can certainly be criticised. For one thing, animals that formed little antibody were eating much less food than was eaten by controls; they suffered from deficiency of calories as well as deficiency of protein; protein is not the only factor. In other experiments in which the depletion of protein has not been so extreme no difference has been found between the amounts of antibodies formed by the deficient and by control animals. When we come to human beings we find that the serum proteins are often not reduced even by malnutrition severe enough to cause famine oedema. And when serum proteins do fall it is the albumen fraction that falls; the globulin fraction, which contains antibodies, is usually little changed. Gell (1948), however, has found that Germans suffering from severe degrees of malnutrition did form less antibodies than were formed by well-fed British soldiers. Malnutrition, if severe enough, may therefore lower this defence in human beings.

Efficiency of an Antigen

Certainly protein is not the only nutrient that is involved in the formation of antibodies. Experiments have shown that the amounts of antibodies formed in response to injections by pyridoxin-deficient rats were less than formed by control rats. The effects of diet on formation of antibodies by animals has a practical importance in testing the efficiency of the antigens used for immunising against diphtheria. Hartley found that guinea-pigs formed more antitoxin on a cabbage diet than on a mangold diet. The chief difference in these two diets would be in the amounts of vitamin A. Observers, using different diets, would draw different conclusions about the efficiency of an antigen.

Cannon's school found that even when the deficient rats formed as much antibody as was formed by controls, more of the deficient rats died when infected by virulent organisms. In the control animals the number of leucocytes in the blood was trebled after infection; in the deficient animals the number did not rise. The effect of less severe deficiency on this line of defence and on the activity of other scavenger cells needs further study.

The few instances in which it has been claimed that resistance to bacterial infections is increased in malnourished animals are unconvincing. The fullest studies have been made on the effect of deficiency of vitamin B on infection of mice with the virus of poliomyelitis. It seems that the chief effect of deficiency is to delay the onset of disease. In an infection by a protozoon—bird malaria—in which the organism can be watched, it is found that the numbers of parasites that invade the red blood corpuscles of chicks is less if the chicks are deprived of riboflavin than if they have a normal diet. In spite of the lower invasion rate more of the riboflavin deficient chicks die. It is significant that in these infections in which the effects are, for a time at least, less severe in malnourished animals, the infecting organism enters and lives in the cells of the host. The difference between the effects in well- and ill-nourished animals lies in the extent or rate of invasion of the host's cells. The organisms are very susceptible to differences of environment. Unlike bacteria, they cannot grow in ordinary culture media, and can only multiply in cells of certain animals. It may be that vitamin deficiencies so alter the metabolism of the host's cells that they are no longer congenial to the invader.

Popular Dietetics

To cover dietetics, even everyday ones, in a matter of seventy-eight pages, is a task which Miss Martin-Leake of the London School of Dietetics has attempted. Undoubtedly she did not intend it to be more than a bird's-eye view of the subject, and perhaps the title of her book* will indicate this.

In her preface, Miss Martin-Leake states that her book is written for the practical dietitian who is *prima facie* a skilled cook and caterer, but who also understands the basic principles of dietetics and of diet building. It is rather puzzling to know that it is for such that the book was written, except that we may have misunderstood the amount of their understanding of the "basic principles of dietetics and of diet building."

The name of books on dietetics giving all the information contained in this book is Legion, and it is difficult to perceive the necessity for such a condensed version of the subject. However, this may be said about many books on most subjects, and it is possible that, being couched in plain language, it may help the intelligent lay reader.

* *Everyday Dietetics.* By M. Martin-Leake. Pp. 78+x. London. Price 6s. net.

The Modern Abattoir

At the Health Congress at Harrogate in May last a paper on the modern abattoir and meat inspection was given by William Tweed, F.R.C.V.S., D.V.S.M., Divisional Veterinary Inspector, Ministry of Agriculture and Fisheries. Among the points he made was that the scheme now in operation dealing with the slaughter of animals, administered by the Minister of Food, might be continued for some time, and it was not known what form future developments would take.

During the last twenty-five years Government interest had not been lacking; various Acts and Regulations had been passed dealing with the slaughter of animals and meat inspection, and several Government Committees had issued reports. A study of these showed that the meat inspection aspect did not conflict with future plans suggested for slaughtering and marketing of fatstock. There was, in fact, a bias in favour of concentration of slaughter, with a preference for abattoirs operated on the factory principle so that greater economy and salvage of by-products might be secured, and also to enable schemes to be carried out for the sale of livestock on a grade and dead-weight basis.

The adoption of factory methods, which are highly developed in the frigorificos of South America, in which efficient treatment of all by-products is an essential and economic factor, might result in a saving in cost of every animal slaughtered.

Slaughtering and Meat Inspection

Dealing with methods of slaughter, Mr. Tweed said that stunning with a mechanically operated instrument should be carried out on all animals before bleeding. The use of electric current of 60 to 70 volts on small animals and the captive bolt guns on larger animals was now generally adopted. Though the stunning of cattle by the electrical method had not yet been adopted in Britain, it was of interest to record that Footner, in Johannesburg, devised a method by which these animals could be electrically stunned by a current of 160 volts applied for thirty seconds.

With reference to meat inspection, Mr. Tweed praised the improvements resulting from the Ministry of Food scheme in making possible facilities for 100 per cent. inspection. This service remained in the hands of local authorities and, with a reduction in the number of slaughterhouses in Great Britain from approximately 16,000 to 600, numerous difficulties in meat inspection occurred as some local authorities were given the task of carrying out a greatly increased amount of inspection if the slaughterhouse happened to be located in their area.

Obscure outbreaks of animal disease occurred from time to time in which emergency slaughter had to be carried out, and information on such cases was of value to veterinary research. An instance in point was the danger of food poisoning from *Salmonella Dublin* infections in bovine animals, and such infections might easily be missed in meat inspection if the clinical history were not available. Indeed, it was stated by German authorities that it was only in calves that the post-mortem lesions might be regarded as definitely indicative of a salmonella infection. In other cases, as in salmonella infection of adult animals, post-mortem lesions could not be regarded as definitely indicative of salmonella infections, and the recognition of such carcasses was therefore fraught with considerable difficulty, particularly if slaughter had taken place in the early stages of the disease. In such cases an ante-mortem inspection or, failing this, a veterinary report as to the reasons for slaughter, could not fail to be of the greatest value.

How to use Steam

Many textbooks on steam have been written, some giving a good deal of theory and a little of practice —usually somewhat out of date. Some are intended to be practical handbooks, and in being "practical" leave the theory unexplained. Mr. Oliver Lyle has produced a book* which probably has no precedent in any subject. He blends theory and practice together with but one end in view—to demonstrate what is efficient and what is not. Constructional details of steam-raising and steam-using plant are wisely omitted: the author seeks to give basic general theory and to interpret this in terms of modern practice. The examples are drawn chiefly from the sugar industry, but many are closely allied to other food industries.

The first two chapters deal with the properties of steam. Commencing with description, rather than definition, of fundamental terms, the reader is introduced to steam tables and the heating properties of steam. In an admirably simple way the temperature-entropy diagram is built up from its individual components, and the use of this and the Mollier diagram in power calculations is well demonstrated. The next chapter deals with combined power and heating from a load point of view, but including many practical examples. The Sankey diagram is freely used to illustrate heat balances.

Lagging is next dealt with, and useful data are tabulated. The choice of materials is not given the emphasis it deserves, and glass in various forms receives only passing mention. Expanded plastics are not mentioned. This section seems less up to date than the remainder of the book, and could well receive close attention when later editions are contemolated.

In discussing steam distribution and quality, the

* *The Efficient Use of Steam.* By Oliver Lyle. Pp. 912. H.M.S.O. Price 15s. net.

author points out that this apparently incongruous combination is closely linked in practice. In keeping with his declared intention of avoiding mathematics wherever possible, the flow of steam through pipes is treated graphically and by tables. These are well illustrated by examples. Steam driers, oil separators, and desuperheaters are discussed briefly, followed by expansion and layout problems. A chapter on the measurement of steam pressure, temperature, quantity, and quality is mostly devoted to the two last-named factors. This is wise, for these measurements are not well described in other books and seldom from a practical point of view. Mr. Lyle goes further and gives worked examples of measuring the quality of steam, using simple apparatus available in almost any plant. He also gives full details of how to construct an indicating steam flow meter.

The technique of taking indicator diagrams is well described in a chapter dealing with reciprocating steam engines and conditions for efficient operation, and there is a good analysis of the irregularities which may be displayed. Following details of the various types of steam trap, the author describes the handling of condensate and the removal of air from heat-exchange equipment. Drying cylinders, jacketed pans, and steam coils are considered in a general way from these points of view.

Theory of Heat Transfer

The theory of heat transfer normally involves a considerable amount of mathematics; Mr. Lyle avoids anything more difficult than logarithms, and he has taken pains to explain his calculations in great detail. The various factors affecting heat transfer are discussed adequately and the Reynolds Criterion simply explained. Mean temperature difference under various conditions of heat exchange are discussed with the aid of several examples. Following this general treatment is a more detailed examination of heat transfer in evaporators. After quoting a rather disarming definition of a vacuum pan, the author explains that his first-hand experience chiefly covers sugar pans and evaporators. Nevertheless, his treatment of jacketed and basket coil boiling pans, calandrias, and climbing or falling film evaporators is applicable to most uses in the food industry. Direct heating by steam injection is dealt with briefly, together with a short description of injectors and ejectors. Flash steam, low pressure vapour, and spray and jet condensers are dealt with, and an arrangement whereby the vapour from a churn washer may be used for reheating the re-circulated hot rinse is described.

A chapter devoted to peak loads is illustrated from colliery, steelworks, dyeworks, and sugar refinery practice. The effects on boiler-house efficiency, output, and quality of process are discussed, and the author rightly concludes that good management is the major factor in smoothing steam demands. Heat storage is a logical corollary to the discussion of peak demands. The Ruths accumulator is described at length, together with its applications and control. Several other types of steam accumulator are described and a detailed treatment of hot water storage is given, including a simple empirical formula for heat loss from storage tanks.

Other important subjects covered are multiple effect evaporation and the use of circulated steam and high-pressure hot water as a solution to the problem of difficult heat transfer conditions such as drying cylinders. "Tireless but brainless" is the author's introduction to automatic controls, and he proceeds to give a useful description of principles and applications.

Heat Balance

The climax of this fascinating book is the chapter on the heat balance, which epitomises the efficient use of steam, and nearly 120 pages are devoted to the discussion of investigations into heat usage. Fully worked examples are given for a laundry, a brewery, a food extract process, and a power station, and the plentiful detail given should enable the reader to apply the technique successfully to almost any set of conditions.

In the chapter on costing and regression, the author again shows his skill in presenting a sound practical account with no complicated mathematics. Three chapters deal with different aspects of saving energy and bring together a great deal of useful material. A chapter on the heat pump and one on the ice-water-steam substance conclude the book. An appendix makes brief reference to binary cycles and paralleling with the grid. A useful commentary on a selection of textbooks is given.

There is a collection of eighty-two tables, many of which are also printed in the text. A very complete index is given. This book sets a new standard in technical literature; it is absorbingly interesting to the reader, and makes a very real contribution to the education of the steam user.—H. S. HALL.

Citrus Fruit Juices Control

THE Advisory Committee, at their meeting on September 27, gave considerable thought to the question of de-control and reviewed the supply position for the coming year.

In view of the information before the Committee regarding possible supplies in 1949, and bearing in mind the political and international situation and prevailing conditions generally, the Committee has decided that they are unable to recommend any modification of the control procedure at present.

The Boom in Copra

A. L. KIDSON

More people than ever before are depending today on the coconut, in one form or another, to provide them with food. With animal fats in short supply, and likely to remain so for a long time, the edible oils assume a new importance, and their market price soars steadily upwards. In recent months the Ministry of Food, which contracts to buy practically all the copra produced in Empire territories, has concluded new agreements with the Governments of Fiji and Ceylon, advancing the price per ton of their copra to £45 and £50 sterling, respectively, with prospects of even higher prices for next year's crop.

A FEW years back South Sea Island copra was selling at £6 per ton; and the planters, agitating then for a guaranteed price, named £8 as the figure which would give them a reasonable profit over production costs. And while those costs have certainly advanced in the interim, Britain nevertheless is now paying boom prices for this line of food, and the growers, to use a colloquialism, are "on the pig's back."

Uses of Coconut Oil

For centuries past coconut oil, the main derivative from copra, has been used for food by the coloured races. Modern industry, however, now converts it into a wide variety of products, mainly foodstuffs. These include margarine, vegetable butters, shortenings for cakes and pastry, salad oils, and cooking oils. Coconut oil is also used as a substitute for cocoa-butter in the manufacture of chocolate; is the base for many hair pomades and beauty preparations; helps out our supplies of glycerine; and is an ingredient in the "cold process" soaps.

The nut itself grows on the coasts of all tropical countries, and is cultivated by planters in India, Ceylon, the Philippines, the Dutch East Indies, Malaya, and the South Sea Islands. Methods of securing the oil have evolved from the crude mortar and pestle process still employed in some backward countries, to the modern hydraulic pressure and solvent extraction processes. Fresh nut kernel is converted into copra by spreading it out in the sun to dry, or by drying it artificially with hot air in kilns.

Extraction Methods

One of the earliest methods of extracting the oil was to break the copra into small pieces and then leave it in the sun to sweat. The Indians improved on this by first pounding the meat in a huge mortar and then squeezing the pulp in primitive presses. By another method fresh kernel was pulped and then boiled, the oil rising to the top of the water where it was skimmed off. This process produces the finest and whitest oil, and is still followed at Cochin on the Malabar Coast. Today, in the trade, the name "Cochin" signifies the highest quality of coconut oil.

Fresh kernel contains about 50 per cent. water and 30 per cent. to 40 per cent. oil. When properly dried, the nut produces about 60 per cent. copra, which in its turn yields 60 per cent. to 65 per cent. oil. In Europe and the United States three main methods are employed for extracting the oil. In the first the copra (after being passed over a magnetic separator to remove bolts, nails, etc.) is finely ground and then heated to 180° F. It passes next through an expeller, which forces out most of the oil. After that the pulp is subjected to hydraulic pressure to obtain the maximum extraction. Some mills employ a single

Drying copra in the sun.

expeller unit, in which case the copra is first dried to reduce the moisture content to about 1·5 per cent. The third process involves the use of petroleum solvents, of the hexane type, using either finely ground copra or pulp which has already passed through the expellers. The solvents are then recovered from the oil by distillation.

Measures to Increase Production

In Fiji today some lively measures are being taken to reach maximum production so that growers may cash in fully on the rising market and at the same time make their contribution to a difficult world food situation. But the industry's lean years during the depression of the nineteen-thirties have left their mark. A survey in 1946 revealed many unsatisfactory conditions in the main coconut areas (Vanua Levu, Lomaiviti, and Viti Levu), particularly among the native holdings.

The main defects found were primitive drying methods, with the kernel spread out on green leaves on the ground or upon open trays, affording no protection against rain and the night dews—all adding up to considerable loss both in quality and quantity of the resultant oil. Other unsatisfactory features were poor storage facilities, the practice of leaving bagged copra stacked on open wharves, its conveyance in leaky small craft, or with open hatches in wet weather, and the adoption of crudely constructed "smokers" for drying the nut. Many holdings stood badly in need of drainage or weeding, while others were being whittled away by soil erosion.

Afforestation and grass planting have now been undertaken in the eroded areas; native villagers are being taught to control the germination of fallen nuts; while in many areas the Malayan dwarf palm, which bears in four years, has been successfully introduced. The Government assists by supplying planters with rice and other food crops so that they may concentrate on copra. In this way production has been stepped up from about 17,000 tons in 1942 to 35,000 in 1947. And so much of this is exported that local millers complain of a shortage for their own requirements; so they are forced to experiment with crushed mustard, groundnuts, and other "small seed."

In Ceylon the coconut crop—about one million acres, out of a *productive* area of seven millions—now occupies most land, and is almost entirely in Ceylonese hands. Since 1942 Britain has contracted, under a bulk purchase agreement, to take all the coconut oil and copra which that island can export, with the exception of about 8,000 tons which goes annually to Pakistan. This arrangement will continue until 1950. The latest price agreement fixes the figure for 1949 at £55 per ton f.o.b. Ceylon ports, with the 1950 price to be adjusted towards the end of next year. A long-term arrangement, possibly for five years, will then be discussed.

A large estate copra kiln built of brick and iron.

Drought Dangers

That island also has seen its copra industry take on a new lease of life under the stimulus of high prices. Production jumped from five million nuts in 1942 to twenty-nine millions in 1945, while the value of the crop rose, in the same period, from twenty-five to 100 rupees per candy. The Ceylon industry is very prone to droughts, which seriously reduce production. A severe one in 1945 lowered the island's exports of coconut products in the following year by 30 per cent. Although about half the crop is consumed locally in one form or

another, exports for the 1939-1946 period averaged out at the equivalent of 900 million nuts. Scientific work, covering the propagation and improvement of the palm, manuring, cultivation, and the technology of the products, is carried out at several government research stations and nurseries, but many of Ceylon's plantations now consist of old trees, and there is need for a progressive scheme of replanting if present levels of production are to be maintained.

Other Productive Areas

The British Protectorate of Zanzibar also grows coconuts in a large way, much of the crop being used to supply the needs of a local soap industry which has long been in existence there. Exports from that area in 1946 totalled 1,345,675 lb. of oil, 17,929 cwt. of soap, and 8,035 tons of copra. While Zanzibar's copra exports fell from 12,000 tons in 1938 to the figure quoted for 1946, their cash value increased from approximately £100,000 to over £200,000. At today's prices the value would be redoubled.

Another potentially productive area lies within the Malay Federation, but so much damage was done to plantations and equipment there during the Japanese invasion that exports have fallen from the pre-war level of fifty-eight million long tons of nut to the 1946 figure of eleven millions. Exports of kernel were similarly reduced, in the same period, from ten million tons to less than one thousand. Apart from enemy depredations and looting by the populace, extensive losses are now caused by squirrels. During the war these pests multiplied considerably, and the shortage of ammunition has made their control very difficult. The rhinoceros beetle, another enemy of the coconut crop, has also increased.

High Prices for Malayan Copra

Copra from this region sold recently on the "free" market at £90 per ton, and although an unsettled political situation is by no means helpful, the high prices are stimulating the work of restoration and replanting. In the Pahang district the coconut crop has increased considerably since 1940, mainly through the development of large Chinese-owned plantations on the Kuantan Road. The factory on this estate is not yet in operation. Also pending restoration is the Coconut Experimental Station at Port Swettenham; public works employees are now engaged there in clearing and draining, but experimental work has not yet recommenced.

Two mills in Suva which use about 45 per cent. of Fiji copra to make into coconut oil.

Crown Copyright Reserved.

The bullock press, consisting of a primitive pestle and mortar for grinding copra.

Photos courtesy The Malayan Information Agency.

Coconut Products

From their coconuts the Malayans have developed an interesting and important product known as "jaggery." This is a form of sugar, and its market value varies inversely with the supply of rationed cane sugar in the Federation. Jaggery finds a ready sale in Singapore, where it is imported from the native areas of Kelantan and Trengganu. Other coconut products much in demand today are the meal or cake used for stock and poultry foods; fibre goods of the coir type for mattress fillings, rope, yarns, and matting; and shell products in the form of charcoal and coconut-shell flour.

Advances in Food Science

IMPORTANT advances in food science and future developments in research on the preservation, storage, and distribution of food are outlined in a report* the majority of which is concerned with the post-war development of the research programme of the Food Investigation Organisation. Two types of objective for the researches are given. The first is the advancement of basic knowledge regarding the properties and behaviour of the various classes of foodstuffs; the second objective is the provision of solutions to specific practical problems of immediate importance. An example of the first type of problem is the study being carried out of the proportions of the main constituents of the carcase of meat animals and their variation during the growth of the animal and from breed to breed and species to species. It has been found that these proportions can be expressed as a single set of curves. These curves have already been of use, as they enable the food value of bulk supplies of meat to be calculated. An example of the short-range practical problem undertaken during the period covered by the report is the prevention of fermentation in the storage and transport of concentrated orange juice.

War-time Research

Divided into two parts, the report deals briefly with the work carried out in the war-time period, and reviews the work done in 1946. During the war work was concentrated on problems of immediate importance, and was mainly of a short-range directed character. Most of the effort during this period was devoted to the development of methods for dehydration of foods, but a number of other lines of research were continued, especially in the early period. One of these culminated in the important discovery in the field of biochemistry of the reversible formation of starch from a particular form of a simple sugar, and the study of the reaction revealed the mechanism whereby the chain molecules of starch and related polysaccharides are built up from glucose units.

Activities during 1946

The section of the report dealing with the work of 1946 forms a readable account for the non-specialist of the progress made during the period. A broad attack has been initiated in the problem of the quality of meat, and as a result of chemical analyses on the various tissues of meat, important results have been obtained which have already found useful applications.

A general collaborative investigation with the Agricultural Research Council on potato problems including such subjects as culinary quality and storage, has been begun. Important research on the preservation of fruits by "skin coatings" (the coating of fruit with various oily or waxy materials) is now bringing successful results. Work on the salt-curing of herrings and the utilisation of fish in dried forms shows promise of providing increased exports. Other work on fish is aimed at increasing the supply of better quality fish throughout the United Kingdom.

The report is fully annotated with references numbering 223, to all the papers published by members of the staff in scientific and technical journals during the period 1940-1946.

* *Report of the Food Investigation Board for the Years 1940-1946.* Pp. 42+ii. H.M.S.O. Price 9d. net.

All About Nuts

NUTS have been the food of man from the earliest times, and their importance at the present date is exemplified by the coconut in the East and in the Pacific; by the peanut to millions in China, India, and Africa; and even by the chestnut in parts of Southern Europe, where it largely takes the place of wheat or bread.

In a book* devoted to nuts and their everyday uses, the author stresses their growing importance in such countries as the United States, where walnuts, almonds, pecans, peanuts, and more recently pistachio nuts, are being increasingly produced and consumed.

Improved methods of processing and packing for export are factors which are stimulating increased use of nuts, and it is now possible to ship kernels long distances or store them for a considerable time without deterioration.

An interesting point raised by the author is the view that as soil erosion may be alleviated by making use of permanent crops whose roots bind the soil together, the use of nut trees may be considered for this purpose.

Dr. Howes has divided his book into three main sections: (1) Nuts from the Tropics, (2) Nuts from Temperate or Sub-temperate Regions, and (3) Nuts in Britain. Minor sections concern processing and storage, miscellaneous and little-known nuts, and recipes for nut dishes.

Each nut has a chapter to itself, which deals with its history, cultivation, climatic conditions best suited for growth, yield per acre, pests, composition, processing and storage.

At the end of the book there are sixty-two references to the specialised literature. There are sixteen excellent illustrations and a good index.

* *Nuts. Their Production and Everyday Uses.* By F. N. Howes, D.Sc. Pp. 264. London. Price 18s. net.

Edible Flour from Oilcake

W. G. CASS.

Part I

The preparation of edible flour from oilcake has for many years been the subject of intensive study, especially in the U.S.A. with cottonseed flour ; and both in that country and elsewhere groundnut and other oleaginous flours—chiefly in admixture with ordinary flour from wheat, rice, or maize—have also been investigated. Under present conditions it is obvious that the subject must gain renewed and added interest.

IN the large-scale schemes for groundnut cultivation in Africa of the British Government, and in other parts of Africa, notably in the Belgian Congo and in the French colonies, the utilisation of oilcake for human consumption is being studied with renewed zeal. At the same time the world shortage also of feeding cake for cattle must not be overlooked, and plausible arguments may be adduced in favour of the view that the best and most economic method of feeding oilcake to human beings is via the cow or store bullock. Although some progress has been made with flour mixtures containing soya, groundnut, or cottonseed flour, it cannot be said that, in the past, these have been popular; probably because ordinary flour (wheaten, rice, or maize) was plentiful; but today conditions are rather different.

Flour Admixtures

Some recent experiments with cottonseed flour in admixture with that of manioc (tapioca) or rice have been recorded by G. Tondeur in *Bulletin Agricole du Congo Belge*, March, 1947, **38**, pp. 1-59. Oil milling in the Congo, mainly with cottonseed, is established at Elisabethville, Mwene-Ditu, and Tinda, and a fourth oil mill is being erected at Businga in Ubangi; but the total of cottonseed milled will still be relatively small—just under 40,000 tons—yielding no more than 13·5 per cent. crude oil and 42 per cent. residual cake. This, however, is quite sufficient to make an appreciable addition to the protein food of the native, or the European too for that matter; although there is said to be a large and increasing demand for the cake as cattle food either in the colony itself or for export, *e.g.* to South Africa. The price of the cake on the home market is strictly controlled, at about 1,200 frs. per ton, at mill, as compared with 3,500 frs. on the Antwerp market. This possibly explains why only about one-third of the total available seed is crushed; and both in Belgium and the Congo, through the Congolese Cotton Committee, the possibility of producing more cottonseed oil and cake has been seriously considered. Much of the seed has been and probably still is used for fuel.

Nutritional Values

Numerous medical and nutrition studies have shown that the natives suffer deficiency both of fat and protein in their diet, and it appears that cottonseed flour would be a convenient addition. Table 1 shows protein, fat, etc., of the flour compared with other flours, beef, and eggs.

Tapioca (from the cassava, manioc, or manihot plant), being almost wholly starch, is hardly a fit subject for comparison. Some of the figures admit of fairly wide variation, such as the fat content of beef. In the case of wheaten flour, an intermediate figure has evidently been given between the protein content of white (8 per cent.) and that of wholemeal flour (15 per cent.). (See Ministry of Food's *Manual of Nutrition*, 1945.) The protein content of cottonseed flour is slightly above that of low-fat soya flour (49 per cent.), and evidently compares very favourably with beef, while the fat content is certainly high, and argues inefficient oil-expellers. Comparisons of protein content as a whole are not entirely satisfactory, and it is necessary to

TABLE 1.

	Protein. *Per Cent.*	*Fat.* *Per Cent.*	*Non-nitrogen Extract.* *Per Cent.*	*Fibre.* *Per Cent.*	*Water.* *Per Cent.*	*Ash.* *Per Cent.*
Cottonseed flour	50·16	10·96	22·95	3·92	6·25	5·76
Tapioca flour	3·00	—	89·00	—	—	—
Wheaten flour	11·40	1·00	75·10	0·30	12·00	0·6
Maize flour	8·93	2·77	75·91	1·22	10·17	1·00
Beef	16·40	16·90	—	—	61·30	0·90
Eggs	13·20	12·00	—	—	73·30	0·60

know something of the constituent amino acids, but this is a refinement sometimes overlooked.

Besides its very high protein and fat contents—compared with other flours—cottonseed flour has also a high ash content. If the food position in the Congo became sufficiently serious it is thought that a certain percentage addition of this flour to the customary flours, especially where these are chiefly tapioca with its low nutritive value, could be enforceable by appropriate legislation, as has been done with other foods in European countries. In one case when mixed flour, tapioca, and cottonseed was offered to the natives and they were informed of its actual composition, they strongly objected, pointing out that it might be all very well for animals but not for men. But in other cases when they were not previously advised, and the flour was used in made-up cooked foods, it was more acceptable. But the tests are incomplete and need to be supplemented by many more in various localities and in a number of different recipes and mixtures.

American Developments

Tondeur discusses at some length (*loc. cit.*) the position of employers in the Belgian Congo concerning the food of their native workers, including legal enactments and hygiene regulations; and quotes also several references to experience in the U.S.A. and elsewhere with cottonseed flour. Although it has not come into extensive use in America, it has nevertheless formed the subject of considerable research, partly due to close relation with chemurgical developments, or utilisation of farm by-products to the utmost for the benefit of both the farmer and the chemical industry. It has usually been recommended in admixture with other flour to the extent of 20 per cent., the other 80 per cent. being generally maize or wheat flour. In such mixtures the protein content would average 18 per cent. to 19 per cent. and the fat 3 per cent. to 4 per cent., while ash would be less than 2 per cent.

Among establishments at present interested in this research are the Southern Regional Research Laboratory of New Orleans; the Trader Oil Mill Co. of Forth Worth (Texas), who manufacture a special cottonseed flour (Coflo=cotton flour) for use in biscuits; and the Schulenberg Oil Mill, which has introduced a similar product. But only a small proportion of the vast American output of cottonseed cake is used in this way. Some interest in the subject has also been evinced in Russia, but few details are available, except that the Skipin process is used in preparing a non-toxic (*i.e.* gossypol-free) flour from cottonseed cake or meal.

Gossypol Removal

The toxic element, gossypol, in cottonseed cake and its removal have formed the subject of a great part of the work on this cake, whether for animal or human use. The toxicity of gossypol has been thoroughly investigated for many years, and no further reference is required here, except to mention that in the Italian journal *Olearia* (Rome) 1947, July, pp. 42-4, a brief review of recent literature includes some account of the four methods which have been tried or proposed for making cottonseed cake non-poisonous—namely, conversion of ordinary gossypol into the less harmful d-gossypol form, fixation in a non-toxic form, elimination by extraction with organic solvent, and removal by mechanical methods. The latest agreed formula for gossypol is $C_{30}H_{30}O_8$ for its three tautomeric forms: b-, c-, and d- gossypol.

The fourth of the above methods of removal or inhibition includes that of Skipin, in Russia, and has given good results, but no details are available. Another mechanical method used in the U.S.A. is known as the MacMath process, and consists of very fine comminution followed by water extraction with or without pneumatic separation. In Italy similar methods, such as atomisation, have been proposed by Bertuzzi, Sernagiotto, and others.

Bread and Biscuit Manufacture

In Italy the view is held that although colour and taste may not be always up to the desired standard and there is some risk of residual toxicity and loss of protein, yet, normally, the use of cottonseed flour as an admixture with other flours may be recommended for certain types of bread and in biscuit manufacture. For example: 70 kilos of wheat flour, 30 kilos of cottonseed flour, 5 kilos of salt, and 20 kilos of palm oil (to prevent undue hardness or dryness) is said to be a good panification mixture. Its chemical composition is: albumin or protein 16·89 per cent., fatty matter 17·39 per cent., moisture 8·99 per cent. There is said to be some uncertainty as to the presence of tryptophane in the constituents, but generally it may be said that cottonseed flour, though inferior to soya flour in respect to essential amino acid content, is nevertheless quite satisfactory when used in suitable admixture, and certainly contains appreciable amounts of the important acids—cystin and lysin.

As to the digestibility of cottonseed flour, the coefficients for its various constituents are: protein 83 per cent., fatty matter 97 per cent., fibre 69 per cent., and non-nitrogen extract 79 per cent. The digestibility of the protein is, therefore, comparable with that of legumes (peas and beans), but somewhat inferior to that of cereals and meat. Olcott's tests with mice fed on cottonseed flour, rendered non-toxic and with stabilised protein content, show that flour obtained by suitable solvent extraction is usually better than that from pressing. It is generally concluded that, when suitably prepared by solvent extraction and cooking or steaming, including extraction of the gossypol constituent by solvent or otherwise, cottonseed flour in admixture with other flours may be safely used in moderation.

Groundnut Flour

Probably of more importance than cottonseed flour is groundnut flour, in view of the vast increase in the U.S. crop in recent years and the proposed large increases in Africa, both in the French and British territories. In the U.S.A., moreover, the whole nuts are used in many ways as an article of food and are not sent to the oil mills. The so-called peanut butter (or oil) has also long been used as a comestible both in Europe and in the U.S.A.

In Paris the new Research Institute for oils and fats (I.R.H.O.) is planning further study of groundnut flour, and has already made a preliminary survey of existing literature on the subject in *Oléagineux* (1947, **2**, 201-207), through Pierre Cuvier, with an attached bibliography of sixty-two references. In this survey, special acknowledgment is made to M. Macheboeuf and co-workers, whose recent work during 1942-1944, published and unpublished, has been drawn upon.

Cake from Groundnuts

Groundnut cake is usually obtained from oil presses of the continuous type, and is often subjected to solvent extraction to reduce its oil content from 7 per cent. to 8 per cent. to 1 per cent. or 2 per cent. In preparing the flour by milling, etc., it must necessarily be freed from impurities such as shell or husk; and some form of heat treatment is also essential in order to reduce moisture, improve taste, and destroy hydrolysing enzymes which cause spoilage during store. This constitutes, in fact, a pre-cooking, which economises time in subsequent use. A moisture reduced to 4 per cent. favours keeping qualities of the flour; and the same applies to reduced oil content, for it has long been known that residual oil in the cake develops acidity much more quickly than the oil which has been removed. It is doubted, therefore, whether the practice (as with soya flour) of producing three grades—high-, medium-, and low-fat flour—can be followed.

Careful heat treatment is essential. Generally it should not exceed 100° C. to 120° C. for about an hour, otherwise the vitamin content, the proteins, and the colour are prejudiced. Grinding of the cake is followed by pneumatic separation instead of the usual bolting or sieving, as the groundnut meal is somewhat sticky and tends to block the sieves.

Chemical Composition of Groundnut Cake

Food value of the flour depends on the chemical composition of the original cake and correct heat treatment. Usually the composition of cake is: protein 50 per cent. to 60 per cent., carbohydrates 25 per cent. to 28 per cent., lipids 7 per cent. to 8 per cent., moisture 6 per cent. to 8 per cent., and mineral salts 4 per cent. The resulting flour will contain less water, fibre, and usually less lipid if most of the oil has been solvent-extracted—namely, down to 1 per cent. to 2 per cent.

Much work has been done on the protein composition of groundnut cake, beginning with Ritthausen in 1864. The two protein constituents are essentially arachine and conarachine, in the ratio of 2 or 3 to 1, and between them they contain a full sufficiency of tryptophane and methionine. Recent work on this part of the subject has been done by Mlle. Sarthou and Roche and Michel (*loc. cit.*).

The carbohydrates, constituting about one-fourth of the cake, are, to the extent of about 50 per cent., glucosides, which are easily hydrolysable and can be readily assimilated. There is also a certain amount of starch. The proportion of cellulose which could not be assimilated would not be more than about 4 per cent. (Jacquot—private communication).

In the crude (non-solvent-extracted) cake there would remain some 8 per cent. of lipids, of which three-fourths would be removable by solvent. The remaining lipids are mostly fatty matter rich in phosphatides, especially phospho-amino lipids of the lecithin type. It is known that the fats, weight for weight, supply twice as many calories to the organism as proteins or hydrates, so that the non-extracted cake with its higher oil content is much more energising than that which has been solvent-extracted; but, as already noted, its keeping qualities are inferior.

The ash or mineral content is distinguished for its rather high proportions of phosphorus, magnesium, and potassium, and relatively low calcium.

(*To be continued*)

Refrigeration Data in a Nutshell

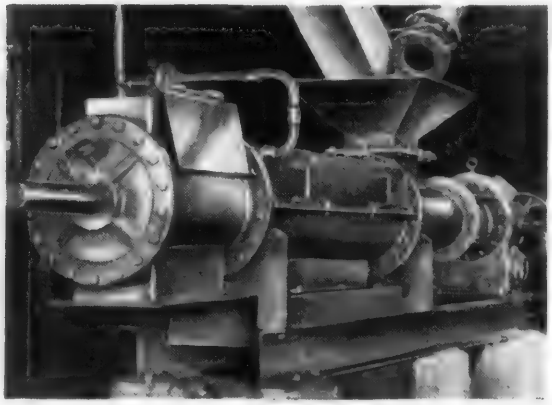
WHILE not making any extravagant claims as to its scope, a little manual* treating of refrigeration presents the subject in the form of questions and answers contained in eighteen sections, ranging from physical principles and definitions to operation of plants.

Some of the more important sections are those devoted to refrigerants, compressors, evaporator design, condensers, cold storage and insulation, air conditioning, automatic control, and the freezing of foods.

For handy reference on the desk, or even in the pocket, this book should be useful to the student, the designer, the maintenance engineer, and the user of refrigerating plant.

* *Questions and Answers on Refrigeration.* By M. E. Anderson, A.M.I.Mech.E. Pp. 160+vi. London. Illustrated. Price 5s. net.

Electricity Revolutionises Fish Oil Extraction Methods



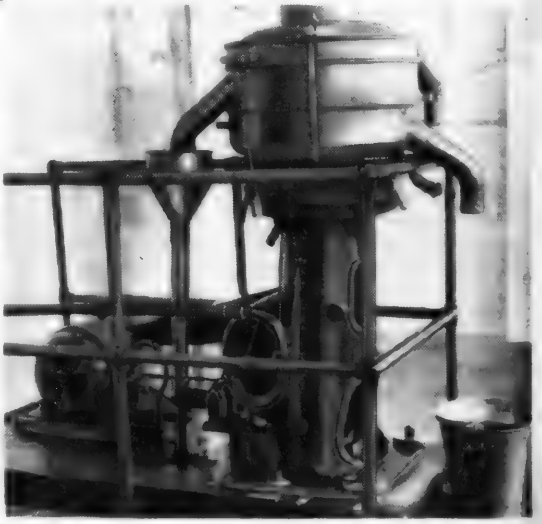
The successful working of this electrically operated press for oil extraction from fish depends largely on the accuracy of speed control.

The substitution of electricity for steam as the motive power can be said to have revolutionised the methods of fish oil extraction adopted by C. T. Bowring and Co. (Fish Oils), Limited, at their Pyewipe Mills, Grimsby. Not only has it made possible the carrying out more conveniently, economically, and hygienically of the original operations, but it has permitted the introduction of new processes which have both increased output and improved the quality of the finished product.

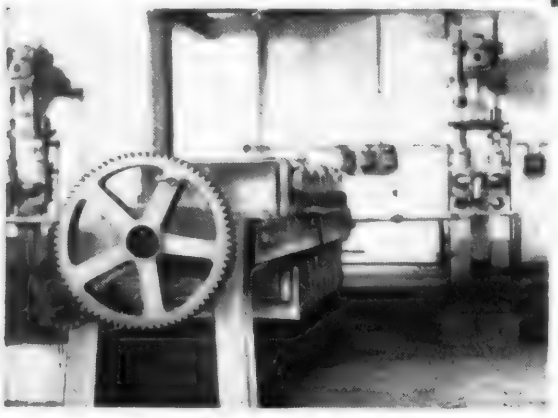
INSTEAD of the 70 h.p. steam engine which drove only line shafting providing power for pumps, hoist, and stirring gear totalling 20 h.p., there are now sixty-seven electric motors totalling 140 h.p. in use. The boiler still provides steam for process work and, operating at a much lower pressure than required for motive power, has thereby had its useful life extended very considerably.

Treatment of the Raw Fish

All types of fish oil are dealt with, but principally cod liver, whale, and recently, to assist in maintaining margarine supplies, herring. Much of the oil arrives in its crude liquid form, which contains a large proportion of water, but some has first to be extracted from raw fish. The latter is taken by means of an electric hoist to the top of the building, where it is placed in large pre-cookers, each holding about 7 tons. Here the fish is steam-heated for twenty minutes and mechanically stirred, chemicals being added to accelerate the disintegration process.

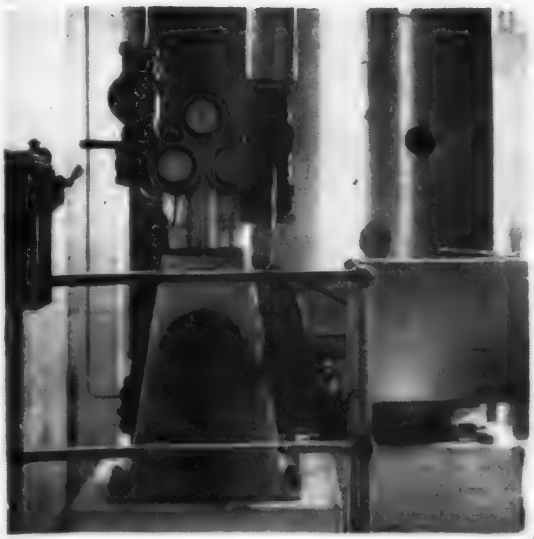


Having left the settling tanks, the oil is freed of residual water by means of centrifuges.



Filtering equipment for separating fat from the oil.

The opening of valves at the bottom of the pre-cookers permits the sludge to discharge into a hopper, whence it is fed into a specially designed press driven by a 5 h.p., 750 r.p.m. squirrel-cage motor. Successful operation of this press is dependent to a great extent on accurate control of speed, which is achieved by means of a double re-



Compressor serving the cold room, where the fat extraction process is continued.

duction unit giving down to 4½ r.p.m. The liquid extracted (oil and water) goes to a receiving tank, the pulp being further processed into fish meal in another part of the factory.

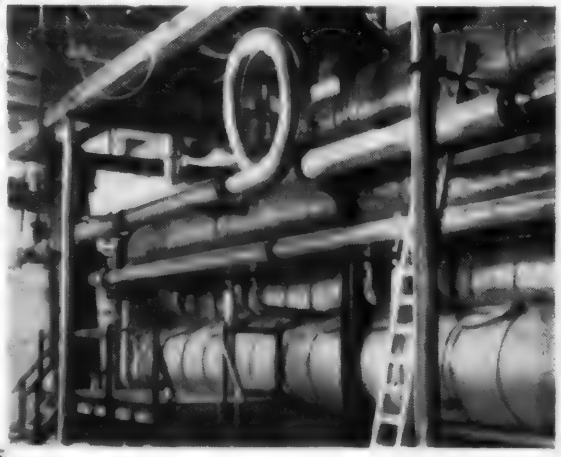
From Receiving to Blending Tanks

From the receiving tank the liquid is passed successively through a series of three steam-coil-heated settling tanks with electrically driven agitators at the top. Here the oil is separated out and rises to the top, water being removed from the bottom of the tanks. When the liquid leaves the third tank the water content is only from 2 per cent. to 5 per cent. This is finally removed by centrifuges driven at a speed of 5,700 r.p.m. by means of 4 h.p. motors. Pumps then carry the oil away to the blending tanks.

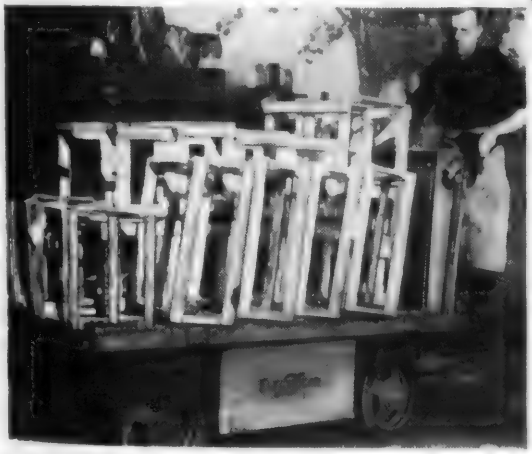
Refining the Oil

At this stage the oil contains a considerable proportion of fat. For certain purposes this is removed by means of filter presses, the oil being forced through cotton twill filter cloths. When a very high degree of refinement is required, this process is carried further by an additional pressing operation undertaken in a cold room at a temperature of 32° F. (0° C.). For this last process a compressor is driven by a 12½ h.p., 935 r.p.m. motor.

Leaving these final presses the oil is taken to a bleaching pan and then stored in tanks to await despatch. Over fifty electric pumps, generally driven by 2½ h.p., 1,420 r.p.m. motors, are employed to transfer the oil from one process to another, and an electric industrial truck is utilised for moving containers, crates, etc. Other applications of electricity are to be found in the hot-air plant for drying both reconditioned drums and also the filter cloths used in the presses. The drums are spray painted, and portable welding plant is available.



A single 30 h.p. motor drives all the conveyors in this latest continuous type of fish meal plant.



An electric truck is used for the conveyance of the containers and crates.

Fish Meal Production

The adjoining fish meal works has also been changed over from operation by a 150 h.p. steam engine to electric drive. Fish offal from the docks is unloaded into a hopper at a predetermined rate and goes through a hacker to be broken up. The fish is then taken by worm conveyor to the top of

(*Concluded on page* 525)

Chemistry and Agriculture

THE close link between chemistry and agriculture was the main theme of the paper read by Professor S. J. Watson, D.Sc., F.R.I.C., at the Edinburgh Meeting of the Society of Chemical Industry held in July, 1948. Scotland has a very complete organisation which deals with teaching, advisory work, and research in agricultural chemistry; the Agricultural College and a number of Research Institutes deal with the soil, the plant, and the animal, and in all of them the chemist fills an important place.

Soil Research

In the field of soil work a considerable amount of fundamental work is carried out on the physical and chemical characteristics of the parent materials and the agricultural soils formed from them. An advisory service has been developed which deals with many soil problems connecting the research worker with the industry itself.

The organic matter in the soil is important and should not be dissociated from the plant nutrients, since proper growth depends on both these factors. The chemical composition of soil organic matter is being studied, and new methods for preparing the humic complex from soils are in use. The degradation products of this complex are being studied by modern chromatographic methods. The effect of organic matter from different sources is being studied in pot and in field experiments.

In the use of chemical fertilisers emphasis is laid on the relationship which exists between phosphorus and the soil. Work has been carried out to measure the relative value of different compounds of phosphorus and the importance of the proper placement of fertilisers is stressed in the light of results obtained in Scotland.

Among plants, grassland is of the greatest economic importance, and work on this crop is selected for consideration. The value of highly manured grass as a complement to rough grazing has been developed and its composition studied. The value of grassland as a source of winter foodstuffs is stressed, and the work in connexion with conservation was briefly reviewed.

Trace Elements

The most interesting chemical work being carried out at the present time is connected with the trace elements. For this purpose a special service is being developed to cover both the fundamental and the routine work in this field of chemistry.

Boron and manganese deficiencies in crops are the only ones of any importance in Scotland, but the increased interest in the growing of small fruit and vegetables calls for a survey of the position of the trace elements in the soils used. Grassland herbage shows deficiencies in cobalt in certain areas, and this has led to a disease in sheep of economic importance. The cure of the "pine" so produced can be brought about cheaply and easily by the application of cobalt salts to the land or by dosing sheep.

An induced copper deficiency is also found in sheep in the disease "swayback," and work is being carried out to try and induce a similar condition by inactivating the copper in the blood of sheep.

Animal Nutrition

In the field of animal nutrition an attack is being made on the place which the constituents of foodstuffs take in the metabolism of the commoner farm animals. Professor Watson also presented a study of the microbiological changes which take place in the rumen, and said that the formation of simple fatty acids in these fermentations was being measured.

The field covered by the agricultural chemist is a vast one, and he has contributed a great deal to the production of foodstuffs in agriculture.

Science and the World Larder

THE world today is short of food. No one doubts the truth of this statement, but how many of us really get down to discovering the whys and wherefores of our present plight? Everyday lay discussions on the subject always include vague references to enormous increases in the world's population and the very real danger of soil erosion—at least the daily Press has instilled into the minds of its reading public the two dangerous elements which have brought us to the present unfortunate state of affairs.

In his scientific study* of the oldest of human needs, Mr. Le Gros Clark approaches his central problem from every angle, gradually weaving his strands into a complete pattern, without attempting to avoid the scientist's objective view of the economic and political implications of food.

The soil and the men who draw their sustenance from it are the focal points of this book, and the author has not failed to concentrate special attention upon the food supply problem of this country.

The book is not entirely devoted to a discussion upon the immediate world problem; the author expresses a long-term view, and outlines some steps which should be taken immediately if the problem is to be solved in any measurable time. The reader will find his picture of the situation made clearer by studying the illustrative figures which appear throughout the book.

* *Feeding the Human Family*. By F. Le Gros Clark, M.A. Pp. 125. London. Illustrated. Price 7s. 6d. net.

Automatic Control in Food Processing

Part I

LEO WALTER, Dipl. Engr.

The increasing use of instrumentation in food industries, and application of automatic control for pressure, temperature, liquid level, rate of flow, and of other variable factors, render it more and more necessary for care to be exercised in the selection of a suitable system for any particular process.

THE fundamental rule for achieving satisfactory control is to choose a controller type which has characteristics in design and function which match those of the process. The variety of methods of food processing is very wide, as is the number of available controller systems. It is not always easy to select a regulator which will meet the demands of a process, and this cannot be done by picking out an instrument from a catalogue. The only way of securing success is by close co-operation between plant and control engineer.

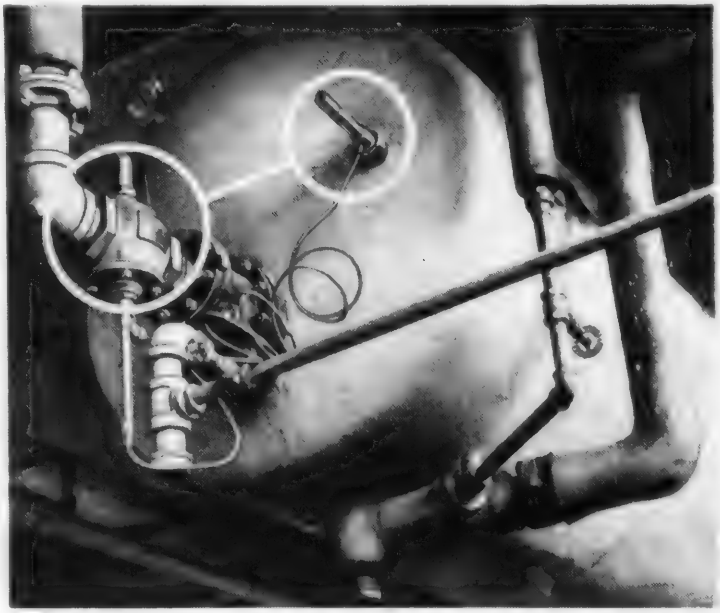
Application of Control

Claims for closeness of control (or accuracy) should be reasonable. Every manufacturing process is capable of a greater or lesser degree of control. Some processes are more controllable by means of hand control than others, and the same applies to automatic control by means of instruments. Where, for example, three tanks of same volume, filled with cold water, require heating to boiling point, the first in which direct steam injection by means of a steam blower (injector) is used, the second in which a copper coil of comparatively large heating surface is fitted, and the third having a small iron heating coil, process reaction rate can be estimated from the time taken for heating to boiling point. Direct steam injection will be quickest, the large copper steam coil comes next, and the small iron heating coil is the slowest. It is obvious that three different controller types would have to be used for controlling the rate of steam flow, if tank temperature has to be controlled below boiling point, say at 200° F. Tank No. 1 would need a very quick-acting temperature regulator, tank No. 2 a regulator with medium responsiveness, and tank No. 3 can be satisfactorily controlled by a slow acting regulator type. Controllability is better with slow reaction rate, because the danger of over-shooting of temperature, if near the desired control point, is smaller.

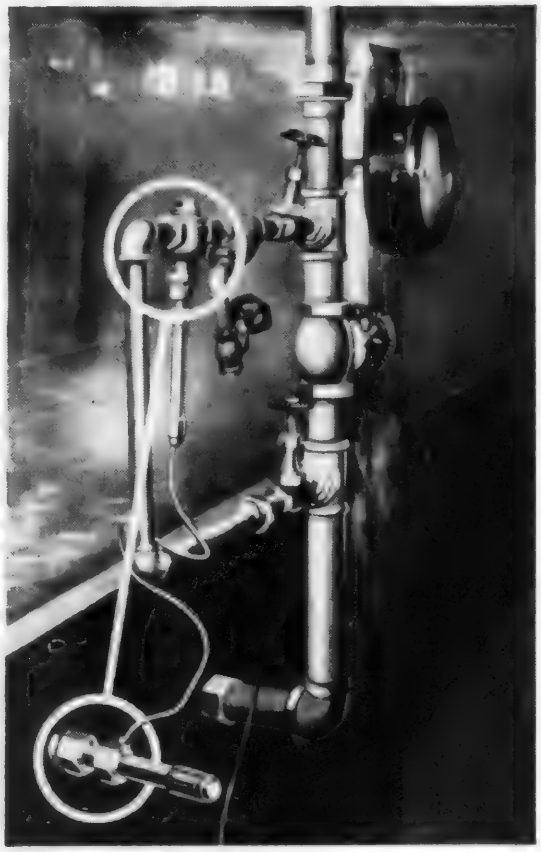
The second decisive characteristic for the choice of controller type is process load. This control term is "heat load" for temperature control, amount of rate of flow for flow control of fluids, or tank volume for liquid level control. The basic consideration is that a fairly steady process load allows the use of simpler controller types, and will usually give close control.

Favourable and Unfavourable Characteristics

Where a process proceeds smoothly, the duty of an automatic controller is light. Hot water storage tanks or calorifiers, having a large storage volume and steady steam supply pressure, hot air conveyor driers with steady feed of goods, having the same moisture content at inlet, or a liquid tank with fairly steady outflow, where level control is easy, may be quoted as examples of a process with favourable characteristics.



Automatic temperature control of large liquid storage vessel heated by steam coil.



Self-actuated temperature regulator fitted on to sterilising tank for canned foodstuffs.

Examples of processes having unfavourable characteristics are chemical reactions, which suddenly develop heat (exothermic processes), a flash type milk pasteuriser with varying inflow, or an instantaneous steam-water heater with varying steam pressure and heavily fluctuating rate of draw-off. These heat flow processes are very unstable, and need most elaborate control designs to achieve satisfactory control.

The choice of controller type should, therefore, be left to the expert, who will select the type of instrument which performs reasonably well under existing working conditions. It should be emphasised that accuracy of control is interlinked with the design of food processing equipment and with the actual working conditions. The latter are most important for controllability of the process, and the same equipment might warrant two different types of controllers if working conditions are widely different. For example, a steady supply of steam at constant pressure in one factory might make the use of a simpler controller type possible on a heat exchanger, whereas the same apparatus might require an elaborate controller type in another factory, where steam supply pressure varies widely and where flow through the exchanger is fluctuating.

Classification of Instruments

Self-actuated regulators may be used for pressure control, the ordinary spring-loaded reducing valve, or its improved form with pilot-valve incorporated. For temperature control, liquid-filled temperature regulators, using liquid-expansion as motive power, or vapour-actuated types with a volatile liquid which vaporises if subjected to heat, may be incorporated within the thermostatic system. For liquid level control the ball-float mechanism, with lever or cable actuating the control valve, is commonly used.

Pressure and temperature regulators, using compressed air for their operation and having a control mechanism connected to a diaphragm valve, which opens or closes with varying output air pressure from the control mechanism, is an example of a pneumatically operated controller. The basic principle is that the control mechanism reacts to impulses from the controlled process and automatically varies output air pressure to the diaphragm chamber of the control valve or damper motor, thus moving the valve steam disc or an air damper. Similar mechanisms are utilised for rate of flow control, liquid level control, boiler or furnace draught control. The mechanisms are similar, and only the primary, or detecting controller element varies according to the variable process factor which it is intended to control.

Another example is the electrically operated regulator, where electricity is the outside source of power, and the control mechanism moves a solenoid valve, a motorised valve, or an air damper motor.

Hydraulically operated controllers are similar to pneumatic types, but use water or oil under pressure for their operation. The motive fluid is supplied under constant pressure to the control mechanism, which varies output pressure to a hydraulic piston cylinder according to an impulse from the process. Large control valves and heavy stack dampers on industrial furnaces can be moved by means of this controlled hydraulic pressure. Combined electro-pneumatic, or electro-hydraulic controllers, are also used.

On off Type of Controllers

The final or regulating element, such as a valve or damper, can only have two extreme positions, *i.e.* open or closed. On/off control is widely used where process characteristics are favourable or where moderate accuracy of control can be tolerated. Examples of on/off (or open-and-shut) controllers are pressurestat switches, thermostat switches, or float switches, all of which either make

or break electric current. All pneumatic or hydraulic types can be used for on/off control.

Although on/off control is widely applied, certain processes demand a finer control, and gradual, throttling, or metering control methods have been developed, with several sub-groups, such as proportional, reset, and reset-rate or stabilised control mode. The characteristic of gradual control is that the control valve or damper moves gradually with the change of controlled temperature, pressure, liquid level, or rate of flow. All controller types, whether self-actuated or power-operated, can be designed for gradual control, which an operator uses by gently opening or throttling a control valve. Gradual controllers are being made in simple types or in elaborate, stabilised types. The latter have to be applied where controllability is low and where corrective action has to be adapted to the way in which process reaction rate changes during processing.

Installation and Maintenance

Fixing and maintenance instructions from the makers should be carefully read before installing a regulator. Thermostat bulbs or tappings for pressure or vacuum control must be positioned where a good average value is obtained. Control valves should preferably be installed in a by-pass, with isolating valves, to enable cleaning, servicing, or repair without interruption of processing. Regular periodical cleaning of valves, strainers, or filters is important, and must be made part of the general overhauling scheme. Preventive maintenance, whereby a time schedule is worked out for servicing, will prevent many breakdowns of controllers caused by neglect.

The practical solution of automatic control problems is first to ascertain the variables to be controlled, such as pressure, temperature, liquid level, etc., and the way in which the process reacts to a change of controlled variable. The latter involves control of process characteristics in general, such as a study of process time lags, process self-regulation, and controllability qualities in particular. The second stage of investigation must be devoted to selecting the right controller type to match process characteristics and to finding the correct way of installing the control instrument. The latter involves position of tapping for a pressure or draught impulse, location of a thermostat bulb for regulation of temperature, correct positioning of control valves or dampers, and so on.

(*To be continued*)

Brine control for cold storage room by means of self-actuated room temperature regulator.

The Food Analyst's Book

In far-away times it was the custom for the king's taster to sit beside him at table and to sample the food in the hope that if anyone were to be poisoned it would not be the king. Methods of analysis have changed since those days, and at the present time they change very rapidly, so that the quinquennial editions of a well-known book* on methods of analysis are always welcome, and make the analyst wonder how he managed before there was such a volume. The present work contains about 25 per cent. more material than the earlier one, and much of this space is devoted to what our American friends generally call, in their blunt manner of speech, the "Filth Test," but for which we prefer their euphonious title, "Extraneous Matter Test." Every British manufacturer who intends to export to the other side of the Atlantic should study this test and its various implications with great care. It is rumoured that a slight hint from our American cousins was responsible for the disappearance of egg powder from the market, and many people feel rather strongly that we should soon be devoting considerable attention to the full implications of this test in this country. Other items to which new or additional space has

* *Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists.* Sixth Edition, 1945, with supplement, 1947. Pp. 932+xii+108. U.S.A. Price 6.25 dollars.

been devoted are cosmetics, enzymes, and vitamins.

The whole book has been arranged on the decimal system, and while this makes cross-reference work much simpler, the reviewer prefers our British method, as adopted in the British Pharmacopoeia, and is of the opinion that the necessity of some of this cross-reference work could be reduced and so save space. If general methods of analysis were separated from the particular they would be more easily followed, and either the first or last portion of the book could be devoted to routine methods for the determination of moisture, nitrogen, fat, etc., with reference to these as occasion arises. The adoption of this type of layout would draw together the various modifications for carrying out various tests and also impress them more effectively on the analyst's mind. The book possesses the great advantage of giving at the commencement of the description of each method of analysis information regarding the apparatus and reagents needed for the particular test. In some books an elaborate analytical method is waded through, and at the end the reader finds that he does not possess some particular piece of apparatus or chemical, and which owing to existing conditions, cannot be obtained.

Cholesterol and Phytosterol in Fats

It is obviously impossible to review a volume of this size in detail, and only one or two points that have been observed when using the book can be noted. For example, the method generally recognised for the determination of cholesterol and phytosterol in fats by the digitonin method (p. 503) is to separate the unsaponifiable matter and to use an alcoholic solution of this. The tentative method of the A.O.A.C. is to shake the alcoholic solution of digitonin directly with the oil or fat. This procedure is very much more rapid, and one hopes that experience will eventually justify its adoption by the Association as the official method. On the other hand, the *p*H of 9·5–10·0 employed for the extraction of lead by the dithizone method (p. 462) has been found to be too high in the reviewer's laboratory when much iron is present, and it is felt that a *p*H of 8·4–8·6 is preferable.

With their usual thoroughness the Association issues periodically a supplement of additions, alterations, and deletions, but again the reviewer feels that the usefulness of this would be greatly enhanced if it were printed on one side of the paper only, so that it could be cut and inserted in the appropriate positions as soon as possible, otherwise the supplement in the pocket at the end of the volume is apt to be forgotten.

When issuing an official work of any kind, compilers have to be extremely careful regarding such things as limits of composition, but again the utility and influence of a book of this nature would be increased considerably if information of this type could be included. For instance, the reader is informed on p. 483 that products such as almond paste containing added water must be freed from moisture before analysis, and information regarding the likely amount of such addition would be welcome.

As the head of a laboratory, the reviewer has only one final complaint—the book is so useful that it is just impossible to prevent one's staff from using it indiscriminately on the bench, thereby rendering sundry portions of the text illegible as the result of the action of drops of acids and similar substances. Need one say more?—T. McL.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, Oct. 1, 1948, page 458.

No.	*Date.* 1948.	PRICE FIXATION ORDERS
1748	Aug. 1.	Order amending the Rice (Control and Maximum Prices) Order, 1943. Revokes S.R. & O. 1947, No. 553.
1749	„ 1.	Order amending the Dredge Corn (Control and Prices) (Northern Ireland) Order, 1947.
1750	„ 1.	Order amending the Bread (Control and Maximum Prices) Order, 1947.
1759	„ 1.	Order amending the Barley (Control and Prices) (Great Britain) Order, 1947. Revokes S.R. & O. 1947, No. 2775.
1760	„ 1.	The Oats (Control and Prices) (Great Britain) Order, 1948. Revokes S.R. & O. 1947, Nos. 1574, 1905, 2788.
1761	„ 1.	Order amending the Wheat (Control and Prices) (Great Britain) Order, 1947. Revokes S.R. & O. 1947, No. 2774.
1762	„ 1.	Order amending the Barley (Control and Prices) (Northern Ireland) Order, 1947. Revokes S.R. & O. 1947, No. 2775.
1763	„ 1.	The Oats (Control and Prices) (Northern Ireland) Order, 1948. Revokes S.R. & O. 1947, Nos. 1575, 1905, 2788.
1764	„ 1.	Order amending the Wheat (Control and Prices) (Northern Ireland) Order, 1947. Revokes S.R. & O. 1947, No. 2774.
1849	„ 15.	The Stock-feed Potatoes (Maximum Prices) Order, 1948.
1850	„ 8.	Order amending the Cheese (Control and Maximum Prices) Order, 1948.
		POINTS RATIONING
1587	July 18.	The Food (Points Rationing) Order, 1948.
1822	Aug. 3.	Order amending the Food (Points Rationing) Order, 1948.
1901	„ 16.	Order amending the Food (Points Rationing) Order, 1948.

Cost Accounting in the Food Industry

Part VI

HARRY DUGDALE, A.L.A.A., A.C.W.A.

THUS far the Production Budgets have dealt with Direct and Indirect Labour and Direct Expenses specifically allowable to Production Centres. The question of materials must now be considered. The planned production will call for defined quantities of materials; if past cost data are available, the average scrap losses can be ascertained, therefore, and taken into the computation of materials required. Thus, if it is known that scrap in the manufacture of a certain type of biscuit is, say, 6 per cent., it must be borne in mind that the completed good output will require, for its production, the materials contained in that good production augmented by the expected scrap loss. A Materials Budget, therefore, is a subsidiary to the master Production Budget; in addition to showing anticipated requirements of materials for production, however, it will serve an additional purpose of showing what volume of materials will have to be purchased.

Consideration of Purchase Requirements

Purchase requirements should then be considered in relation to seasonal demand and speed of supply. A reasonable *buffer* stock of essential materials must always be maintained by the food manufacturing company, but the basic point is that this must not be allowed to exceed that reasonable point. If it does grow in excess of normal, there is the risk of capital being "tied up" in stocks when it could be put to more profitable use elsewhere. Moreover, slow-moving stocks have the unfortunate habit, in certain cases, of developing into absolute losses, especially where the constituent items are perishable. It is sufficiently obvious from the foregoing that the Materials Budget is perforce bound up with volume of production, availability of supplies, and possible purchasing economies accruing from bulk purchases made on forward contracts. Hence, very careful thought must be given to its preparation. Materials must always be in stock to meet production requirements, otherwise the factory production planning is vitiated, but the financial aspect, including not merely the "tying up" of capital but the availability of capital wherewith to make these purchases, must be considered.

Factory overheads must have a specific budget. This will contain amounts for rents, rates, lighting, heating, power, plant and buildings maintenance, depreciation, insurances, welfare, production planning, and all the other indirect charges (excluding the costs of selling and administration, which have specific budgets) entailed in running the modern factory. In building up this Budget (as with those for Production Departments) full use must be made of past data. Now a modern trend in budgeting is that of functional responsibility. If the management of the company is to be working on a reasonable basis with its departmental executives in the matter of functional budgeting, then each departmental executive who is to be held responsible for budget attainment should

> (*a*) have incorporated into his budget only those expense items which it is possible for him to control; and
>
> (*b*) he must have some say in the amounts required of the constituent items of that budget.

The latter point should, however, have the rider added that the department's requirements, in the field of expenditure, must be capable of being supported by past results adjusted to meet changed conditions. Thus, for example, a departmental executive may tend to stipulate for amounts of expenditure on the various items which are in excess of true requirements, thus giving him a "reserve" against overspending on his part; but this is not successful budgeting, for it is not truly economic. Past cost accounting data should be used, therefore, by the Budget Officer in criticising the Functional Budgets. Where the Budget Officer is convinced, moreover, that these Budgets are excessive in amount, he should bring this matter up to the Budget Committee, explain to those executives at fault precisely which items should be scaled down, and come to an amicable solution in conference.

Selling and Administration Budgets will be framed on similar lines, discussed, altered where necessary, and approved.

Expenditure under the Capital Budget

The Capital Budget comprises the expenditure proposed to be made during the year on major capital projects such as the purchase of additional or replacement plant and machinery, building extensions or alterations, and the like. This Budget must obviously be the responsibility of the directorate, although it is framed in consultation with responsible executives of the company. It will at once occur to the reader that the items embraced in a budget of this kind are in very restricted supply these days. Major alterations to plant cannot be effected with ease, simply because the flow of new plant has not attained the volume existing pre-war.

Despite this, however, what can be obtained should, if required, be budgeted for and a curtailed Capital Budget drawn up accordingly. It should then be agreed upon by the full board of Directors and the appropriate Minute written to place on the records this Capital Sanction. Thereafter, the directorate should be furnished, at each board meeting, with a schedule showing capital expenditure during the month and cumulatively from the beginning of the year.

Purpose of the Financial Budget

A Financial Budget completes the organisational procedure. The purpose of this budget is to ensure the availability of working capital throughout the year. The company may be a strong one, with ample reserves, and a liquid position enabling it to achieve the predicted production without having recourse to outside financial sources. Conversely, however, it may be reasonably strong but not sufficiently liquid in certain months of the year. Hence, the Financial Budget, drawn up on the lines indicated below, will serve to draw attention to periods of non-liquidity, and if the amounts of these are substantial, careful consideration will be required as to the source and mode of obtaining the additional finance.

FINANCIAL BUDGET.

Opening balances:
- Cash in hand .. ..
- Cash at bank .. ..

Add Income from:
- Trade debtors .. ..
- Investments .. .. ..

Deduct Expenditure on:
1. Wages .. .. ..
2. Departmental expenses
3. General works overheads
4. Selling charges ..
5. Administrative charges
6. Payments to creditors ..
7. Capital projects ..
8. Taxation payments ..
9. Dividend payments ..
10. Debenture interest payments .. ..

Approx. balance or overdraft

An examination of the foregoing shows that the production and other budgets must be broken down into monthly or four-weekly budgets, but this is done not merely to formulate the Financial Budget but also to allow for monthly budgetary control being maintained throughout the factory. Where production volume is stable, these monthly budgets will be likewise stabilised; on the other hand, where production oscillates from low to high over various months, then budgetary allowances must likewise vary in respect of variable items of expense. This calls for the modern technique of flexible budgeting, which enables the Budget Officer to ascertain the valid allowance at any volume of production.

Finally, with the whole series of budgets completed, it is possible to obtain, in advance, an approximate picture of the year's trading operations, provided sales are made in the volume and variety predicted and that budget allowances are closely adhered to. Month by month, thereafter, the Budget Officer will depict actual expenditure (analysed to functional executives) against budgeted expenditure, and adverse variations will be fully investigated to reveal this departure from planned profit.

Budgetary control, on the flexible principle, is without doubt one of the leading tools of management in modern industry, and more and more companies are resorting to this aid which, in conjunction with Standard Costs, supplants rule-of-thumb procedure. Many well-known companies in the food manufacturing industry have not failed to realise the benefits of such planned procedure.

Wear and Tear or Replacement of Plant

In computing profits for both income tax and also for profits tax purposes, the cost of capital assets, such as machinery and plant, fixtures and fittings, is not allowed as a charge, nor is depreciation in respect of such assets. It is, however, permitted for the trader to claim either wear and tear, or the cost of replacement of assets. Wear and tear, since the passing of the Income Tax Act, 1945, is granted as a percentage deduction of the value, as computed for income tax purposes, of the machinery and plant in use at the end of the basic financial year; thus the allowance is granted on the cost for the first income tax year and the written down value—that is, the cost less the wear and tear allowed, in subsequent income tax years. To this percentage allowance, an addition of one-quarter of the amount calculated is made. An Initial Allowance, equal to 20 per cent. of the cost, is also granted for all machinery and plant purchased on or after April 6, 1944, although no expenditure can be deemed to have been incurred prior to April 6, 1946, prior expenditure being taken as incurred on that date. The Initial Allowance is granted in the income tax year in the basis financial year of which expenditure is incurred.

Claiming a Balancing Allowance

It is also possible, if machinery and plant is scrapped and there is an income tax loss, for a Balancing Allowance to be claimed, but should machinery and plant have been sold at a profit, then this is assessed to income tax by means of a

Balancing Charge. Either the Balancing Allowance or the Balancing Charge is granted or made in the income tax year in the basic financial year of which the event takes place. The effect is that if wear and tear is claimed, provided proper records are kept and the proper claims made, the whole loss in value of machinery and plant can be legitimately charged against the profits for the purposes of income tax.

Machinery and plant includes not only the items normally classified as such, but fixtures and fittings of a durable nature—motor-cars, motor-lorries, and so on.

If wear and tear is not claimed, it is possible to claim the cost of replacements and in certain circumstances the whole cost is allowed, even if it is higher than the original cost, although the Inspector of Taxes has the right to limit the amount allowed to the cost of the asset which has been replaced.

Obviously improvements will not be allowed; the trader, therefore, has to decide which method he will adopt to claim for the loss in value through depreciation, etc., of the plant and machinery during the period of its use. If he adopts the wear and tear method, he will, provided trading profits are made, get the full allowances for all the losses. If he claims replacements, however, although he might benefit because of increased cost of replacement, he is taking a gamble, because if the asset is not replaced, he will get no allowances.

It is contended that it is advantageous to a business to have the allowances when forced to incur the capital expenditure, but since the passing of the Income Tax Act, 1945, considerable allowances are granted in the first income tax year and, consequently, even this advantage is partially off-set.

Dust Problems in Flour Milling

THE development of dust separating equipment in connexion with grain cleaning and flour mill processes has been closely linked with that of pneumatic and fan engineering during the past hundred years.

Dust extraction from grain or mill stocks involves problems of dust separation from large volumes of rapidly moving air. Modern dust collectors are of the cyclone and textile filter varieties, the latter usually being the highly efficient suction type. The discharge of exhaust air from each system to outside atmosphere is effected by way of wind-rotated roof cowls.

Although grain and flour dusts are not dangerous from the general health point of view, their control is essential as they can render working conditions unpleasant and are conducive to skin troubles, etc.; moreover, the Factory Acts render their effective control obligatory. Absence of dust in the mill atmosphere is desirable to prevent contamination of the flour. Further considerations are that the presence of bacteria on the skin of grain causes dust accumulations liable to become mouldy and heat, and due to their inflammable nature there is even risk of spontaneous combustion.

Explosion Dangers

The most dangerous property of these dusts is their ability to form explosive mixtures with air under suitable conditions of concentration and in the presence of a source of ignition. Chief among precautions to eliminate such a hazard are efficient and well-designed exhaust and collecting systems; there should be no possible source of heating or ignition in or near danger spots; the protection of electrical equipment is vital and, in drier climates, certain machinery and transmission gear must be grounded to prevent accumulation of static charges; comprehensive fire precautions are essential. Finally, the careful design and planning of buildings is very necessary, combined with their careful supervision and good housekeeping methods.

Developments in milling technique and equipment are likely to influence future methods of dust control, as evidenced by the present applications of pneumatic conveying to flour mill stocks which eliminate the necessity for a separate exhaust on roller mills.

Abstract of a paper presented by Mr. Leslie Smith at the conference on "Dust in Industry" at Leeds University, under the auspices of the Society of Chemical Industry.

Electricity Revolutionises Fish Oil Extraction Methods

(*Concluded from page* 517)

the concentrators where it is passed through a series of steam-heated cylinders for disintegration. In the latest type of fish meal plant just installed (1½ tons an hour), the whole mechanical operation is carried out by means of a single 30 h.p. slip-ring motor. Five other concentration plants (3 tons each) are operated through shafting by means of a 50 h.p. slip-ring motor.

The finished material is taken by bucket conveyor either direct to bagging-off apparatus or *via* a chute to a magnetic table to remove stray ferrous impurities. After being ground it is taken by means of a conveyor and elevator system for blending, riddling, and bagging.

In both the fish oil and meal plants a considerable amount of water is required, and all this is supplied by the company's own pumps. Additional submersible pumps are in course of installation.

Courtesy "Electrical Review."

News from the Industry

FORTHCOMING EVENTS

Institute of Economic Engineering

Meetings arranged by the Institute of Economic Engineering for November, 1948, are as follows:

Midlands. Nov. 6, at 2.30 p.m., at the Technical College, Coventry. Film show ("Pluto," "Thro' the Mill," and "The Tube Age") by courtesy of Stewart and Lloyds, Ltd.

N.E. London. Nov. 11, at 7 p.m., at Pimm's Restaurant, Bishopsgate. "Alternative Incentive Methods in Industry." A paper will be read, followed by questions addressed to the speaker.

Central London. Nov. 19, at 7 p.m., at St. Ermin's Hotel, Caxton Street, Victoria, S.W.1. "Production Development in Southern Rhodesia," by Sir Miles Thomas, Vice-Chairman of B.O.A.C.

The Institute of Brewing

The following meetings arranged by the London Section of the Institute of Brewing will be held at the Horse Shoe Hotel, Tottenham Court Road, London, W.1, at 6 p.m.:

Nov. 8. "The 1948 Barley Crop in Scotland." A. O. Hutchison, B.A.

Dec. 13. "Diastatic Power and the Mash Tun." Dr. I. A. Preece, M.Sc., F.R.I.C.

1949.

Jan. 10. "Park Royal Brewery." M. W. Plumpton, M.I.Mech.E., M.Inst.F.

Feb. 14. "An Outline of the Brewing Industry in New Zealand." R. K. Logan, M.A.

Mar. 14. "Bottling: A Miscellany." A. J. Curtin Cosbie, B.Sc., A.R.I.C., A.R.C.Sc.I.

Mar. 28. "Malt Analysis. A Discussion of the Recent Revisions in the Standard Methods of the Institute." A. A. D. Comrie, B.Sc., F.R.I.C.

The meetings are open to all those interested.

Productivity Pageant

All the products for which Sheffield is famous, together with the methods of manufacture, will be shown in a new kind of pageant to be held at Sheffield between November 15 and 27. At a lunch given in London recently when Sir Harold West, chairman of Newton Chambers, Ltd., and other prominent Sheffield industrialists spoke, it was indicated that the exposition will utilise all the art, colour and music of the theatre and stimulus of the pageant to tell the story of Sheffield's industrial life. Tours of industries as well as personal visits will also be arranged.

Royal Institute of Chemistry

The following meetings are included in the autumn programme of the London and South-Eastern Section of the Royal Institute of Chemistry:

Nov. 6. "The Origins and Prevention of Laboratory Accidents." (Joint meeting with the Institutes of Physics and Metallurgists.) 10 a.m. at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C.2.

Nov. 17. Annual General Meeting, followed by film "Atomic Physics." 6.15 p.m. at Film House, 142, Wardour Street, W.1.

Nov. 19. Streatfeild Lecture. Prof. J. C. Earl, Ph.D., D.Sc., F.A.C.I., F.R.I.C. 6 p.m. at the Geological Society, Burlington House.

Nov. 29. "The Electron Microscope." (Jointly with Woolwich Polytechnic Chemical Society.) M. S. C. Birbeck, M.A. 6.45 p.m. at Woolwich Polytechnic, S.E.18.

Dec. 2. "Careers for Chemists." N. Booth, Ph.D., F.R.I.C. 7.30 p.m. at Acton Technical College, High Street, W.3.

Dec. 6. "Drug Action, Ions and Neutral Molecules." A. Albert, D.Sc., F.R.I.C., Hon.F.P.S. (Victoria). 7 p.m. at Norwood Technical Institute, Knight's Hill, S.E.27.

Sir John Cass Technical Institute

The prospectus of the Sir John Cass Technical Institute for the session 1948-1949 has been issued giving particulars of the Day and Evening Classes in mathematics, physics, chemistry, biology, botany, metallurgy, arts and crafts, tailoring, and navigation. Included in these is a course of ten lecture-demonstrations on "Microchemical Analysis" by D. W. Wilson, M.Sc., on Thursday evenings from 6 to 8 p.m., commencing January 20, 1949. Other courses cover "Spectroscopic Analysis" and "Advanced Organic Chemistry."

Food Group Conversazione

The second conversazione of the Food Group of the Society of Chemical Industry will be held on November 10, from 6 p.m. until 9 p.m., at the United Dairies, Ltd., Central Laboratory, Wood Lane, W.12, by kind permission of the directors.

Arrangements are being made, as on the first occasion, for the demonstration of chemical and physical apparatus and methods of analysis used by food scientists. Members who wish to contribute by demonstrating any particular apparatus of their own will be particularly welcome.

It is also intended to show a film during the evening, supplemented with lantern slides and photographs of the Food Group on tour in Eire.

Agriculture Group of the S.C.I.

The three remaining meetings for 1948 of the Agriculture Group of the Society of Chemical Industry are:

Nov. 16. "Soil Survey and Soil Classification." Dr. A. Muir. 2.30 p.m. in the Chemistry Department of the Royal College of Science.

Dec. 9. Joint meeting with the Fine Chemicals Group. "The Chemistry of Plant Growth Regulators." Dr. W. A. Sexton. 7 p.m. in the London School of Hygiene and Tropical Medicine.

Dec. 14. Joint meeting with the Food Group and the London Section. "World Cereals Today." Mr. C. A. Loombe. 5.30 p.m. in the Chemistry Department, Royal College of Science.

Engineering Exhibition

The Engineering, Equipment and Materials Exhibition will be held at the Old Horticultural Hall from January 26 to February 5, 1949. It was originally planned to hold the exhibition in October of this year, but it was finally decided that the later date would be more convenient.

The exhibition will be chiefly for trade buyers from home and abroad, the object being to show overseas visitors in particular that Britain still leads the world in the engineering and industrial equipment markets.

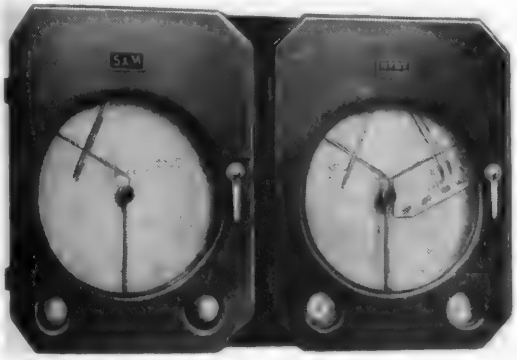
The Dairy Show

The sixty-second annual Dairy Show was held this year on October 26, 27, 28, and 29 at Olympia. A feature of the show was the re-introduction of produce classes with special prizes for cheese, butter, bottled fruit and jams, and honey.

*

Control Instruments

Two interesting developments were shown for the first time by Short and Mason, Ltd. A new type of H.T.S.T. "packaged" control system, combining a safety thermal limit recorder, water temperature indicating control, brine temperature control and cold milk temperature recorder, incorporating every feature in one compact unit. The safety thermal limit recorder utilises a temperature system which gives a faster speed of response than hitherto, and coupled with a quicker acting electric contact mechanism, the flow diversion valve operates almost instantaneously in its response to changes in outlet milk temperature.



The new type of H.T.S.T. "packaged" control system, combining safety thermal limit recorder, water temperature indicating control, brine temperature control, and cold milk temperature recorder.

A new flow diversion valve with an enlarged diversion port which reduces pressure drop through the valve was also displayed. If air or electricity fails, milk is automatically diverted for re-heating.

Other exhibits included temperature and time cycle controllers as well as single and two pen type recorders for the milk, ice cream and associated industries.

Electric Vehicles

A feature worthy of note in the pedestrian-controlled electric vehicles, manufactured by Diamond Motors (Wolverhampton), Ltd., which were on view, was the patented power unit which is self-contained and consists of a motor, driving *via* a clutch, to a reduction gearbox, thence by sprocket and chain to the single front traction and steering wheel. It also comprises the entire control and steering mechanism. The automatic clutch prevents initial shock, surge, stalling of the motor and consequent damage to the batteries. Heavy duty traction batteries are fitted and guaranteed for three years. For general internal use, a plain platform body is fitted which is suitable for carrying a large variety of goods.

*

Flavours and Colours for Ice Cream and Mineral Waters

Among the exhibits of Cumming, Parsons, Ltd., at the show were a wide range of essences, colour and flavour compounds, ice cream powder, concentrated milk shake bases, liquid food colours, and fruit juice concentrates. In addition, the firm exhibited a stabiliser for ice cream which is suitable for either hot or cold mixings, giving smoothness and fine texture to the finished ice cream and also assisting in obtaining a full overrun.

*

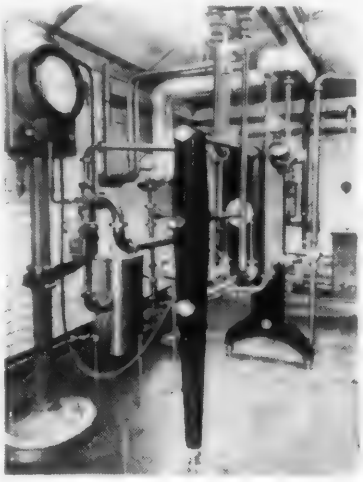
Refrigeration Plant

Equipment exhibited by J. and E. Hall, Ltd., consisted of three ammonia refrigerating compressors of the twin-cylinder Monobloc type, one triple-cylinder methyl chloride compressor, five Hallmark automatic methyl chloride refrigerating machines, a self-contained display cabinet for quick-frozen foods, an ice cream hardening cabinet, and a "Lolly" freezing unit shown in operation.

*

Pasteurising Plant

The A.P.V. Co., Ltd., whose stand was in the same position as in last year's show, displayed a complete installation of Type H.T.C.A. Paraflow short-time pasteurisation plant. The installation, which is suitable for the smaller dairies, was piped up to stainless steel storage and receiving tanks and included all auxiliary equipment. Also exhibited was a Paraflow short-time pasteurisation plant, Type H.M., complete with a new type of pneumatic control panel, and supported by a display explaining its features. Other exhibits included a Type H.T.A. Paraflow, appearing for the first time, a batch pasteuriser, and a cream ripening vat.

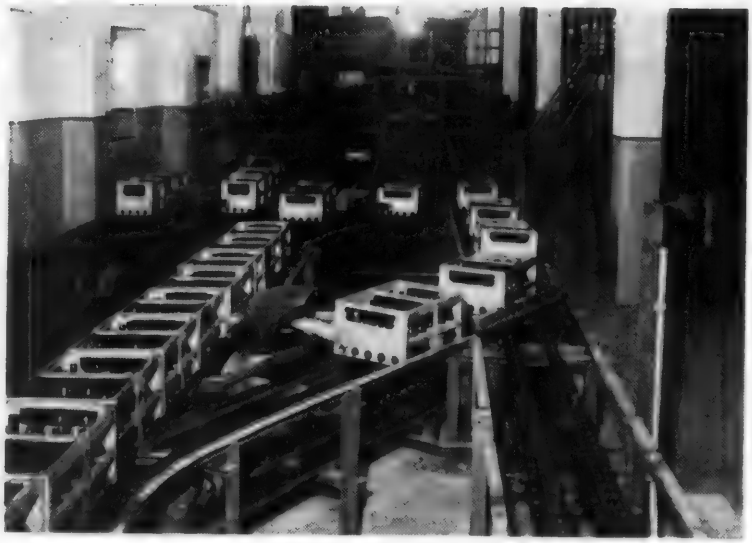


Short-time pasteurisation plant, type H.T.C.A., with a capacity of 150 to 400 gallons per hour.

*

General Dairy Equipment

Included in the range of steam raisers shown by The General Electric Co., Ltd., were the floating electrode and storage types. Further exhibits of interest were the double sack hoist with a capacity of 2½ cwt., and a model of a barn hay drying installation.



The empty case conveyors, showing "automatic policemen," conveyor ploughs, and control office.

Automatic Beer Bottling Plant

Provided with ten production lines fed by an elaborate system of chain conveyors controlled electrically and equipped with automatic switch gear at junctions, the new bottling plant opened by Ind Coope and Allsopp, Ltd., at Burton-on-Trent on September 30 has a total filling capacity of one million bottles of beer daily. Beer is at present supplied to the plant by means of tanker lorries, but will eventually be pumped from the brewery through a stainless steel pipe-line half a mile long.

At each stage of production, "magic eye" ray counters are fitted, and these record in a central control room, whence it is possible to supervise the ten production lines, to keep in touch with the production processes at every stage, and to control the type of beer fed to each production line.

Cases of empty bottles arriving at the plant are placed on the conveyor system which automatically grades them into their four separate sizes and feeds them to the appropriate production line. The first process is the washing and sterilising of the bottles, which are inspected on leaving the washers, any faulty ones being removed from the production lines. The cleaned bottles are then conveyed automatically to the filling machines to be filled with beer piped through an air-conditioned trunk from a cold room which holds enough beer to last each unit one shift. After corking, the bottles pass to the pasteurisers and thence to labelling machines with a capacity of one hundred dozen an hour. After re-packing in crates the bottles travel on conveyors to the loading platform.

Oil-Sealed Vacuum Pumps

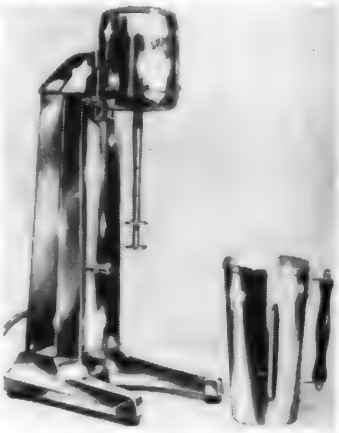
With a rated speed of 600 revolutions a minute, the rotary oil-sealed type vacuum pumps manufactured by the Pulsometer Engineering Co., Ltd., have a swept volume of 4 cubic feet per minute. The top of the cylinder casting is extended to form an oil-well which seals the discharge valve and feeds oil to the cylinder bore for lubrication purposes. Instead of providing a conventional stuffing box, a rotary seal is used which, besides being air-tight with normal working conditions, reduces the power absorbed and does not score and wear the shaft.

When worn, the cylinder bore can be reground, the rotor being readjusted to maintain the line contact by lifting the end covers which are without spigots for this reason. In the event of the pump being shut down by mistake, provision is made to prevent oil flowing back into the apparatus which is being evacuated. For clean air circuits a continuously circulating automatic lubrication system is employed, while, to counteract the effect of moisture and condensable vapours passing through, the pump can be fitted with drip feed lubrication.

Agricultural Research

Gratifying progress in the resumption of their normal activities during the year under review is announced in the twenty-first annual report of the Agricultural Research Institute of Northern Ireland for 1947-1948. While it was necessary to continue the direction of farming operations towards maximum food production, it was possible to develop investigational work in grassland husbandry and conservation in addition to other research activities with livestock.

Drink Mixer Works by Electricity



Provided with a new type of automatic switch equipped with silver sliding contacts, a new all-metal electric drink mixer is designed to withstand hard working conditions. The universal type motor fitted with bearings which require no attention can be easily detached without disturbing the wiring. The stainless steel spindle revolves at approximately 12,000 revolutions per minute and is offset in relation to the fluted beaker, thus ensuring complete emulsification of liquids and rapid mixing.

Chemical Plant Exports

Concurrently with their many social activities, a lively account of which is contained in the autumn issue of their house journal, Bamag, Ltd., are busy exporting chemical plants all over the world. An idea of their contribution to the export drive is given by the article "Bamag Round the World."

Reads, Ltd.

Reads, Ltd., wish to point out that in their advertisement in the October issue of FOOD MANUFACTURE the following information was inadvertently omitted:

Ringseal Necks are covered under British Patent applications nos. 480319, 480339, 8804/47, 19549/47, and patent applications have been made in most countries in the world.

New Cod Liver Treatment gives Better Oil

An interesting addition to trawler equipment for handling cod livers which is being fitted on British vessels conveys the livers cold to the tank with a resultant improvement in oil quality. The equipment consists of a watertight hopper through which livers are fed to a Mono pump which transfers them through a 4 in. bore pipe to a tank directly over the liver boiling house. The partial disintegration of the livers passing through the pump provides ample lubricant and obviates the necessity for any dilution. The pump, which runs at about 200 r.p.m., is driven by Vee-belt from a 4 h.p. electric motor, and the whole unit consisting of motor and pump is fitted in a watertight box at the aft end of the working deck. The hopper, which is of a fixed capacity to enable the quantity of livers to be measured, is fitted on top of this box and is itself fitted with a hinged watertight scuttle. The delivery pipe is led through the engine casing to provide protection from low temperatures and thence to the boat deck where the livers are deposited in a 200 gal. tank which is conically shaped at the bottom to permit a gravity flow for the livers to the boilers. A steam supply isolated from the pump by a valve is connected to the delivery line for cleaning purposes.

Obituary

It is with regret that we announce the death on September 16 of Sir C. Eric Palmer, grandson of one of the founders of Huntley and Palmers, Ltd. Starting as an apprentice in the biscuit factory at Reading in 1906, Sir Eric passed through every department in the business and in 1909 became a director of the firm. In June, 1926, he was elected chairman of the company and a year later he became chairman of the Associated Biscuit Manufacturers and was elected President of the National Association of Biscuit Manufacturers. During the late war he became chairman of the Cake and Biscuit Manufacturers' Wartime Alliance and a knighthood was conferred on him in 1946.

Sir Eric was a Deputy Lieutenant, a Justice of the Peace for Berkshire, and chairman of the Reading County Magistrates. He was High Sheriff of Berkshire in 1926 and 1927.

He leaves a widow, a daughter and a son, Lieut.-Colonel C. Alan S. Palmer, D.S.O., who is a director of the firm.

■

We regret to announce the death of Mr. Arthur E. L. Slann, managing director of W. J. Bush and Co., Ltd., which also occurred on September 16.

His untimely death brings to a close forty-seven years of devoted and able service to the company. Mr. Slann was one of the earliest chemists engaged by the company and became a senior member of the technical staff, maintaining liaison between the head office laboratory and the various factories situated in this country and overseas.

■

We record with regret the death on September 21 of Sir Charles Wrench, a director of Stevenson and Howell, Ltd. Joining the firm in 1893, he became a director in 1917, and had intended to retire at the end of this year.

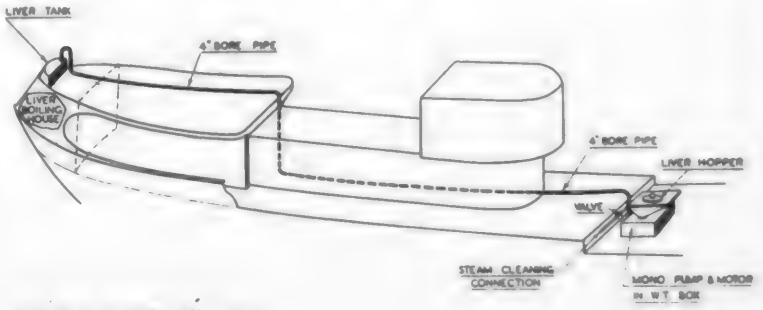
Knighted in 1935, Sir Charles was a great sportsman, and members of the Confectionery and Allied Trades Sports Association will recall the invaluable service he rendered during 1937/8 when he acted as President. His interest in boys' clubs was of long standing; he served as honorary secretary of the London Federation of Working Boys' Clubs, as it was then known, for thirty-five years until he was elected President.

He maintained his enthusiasm and those who knew him were only formally surprised to hear that in 1935 he had taken out a pilot's licence; he flew a Moth until the outbreak of war. He was a J.P., a member of the M.C.C., of the Royal St. George's Golf Club and of the National Liberal Club. By his death the cause of voluntary social service and of London working boys in particular suffers a great loss.

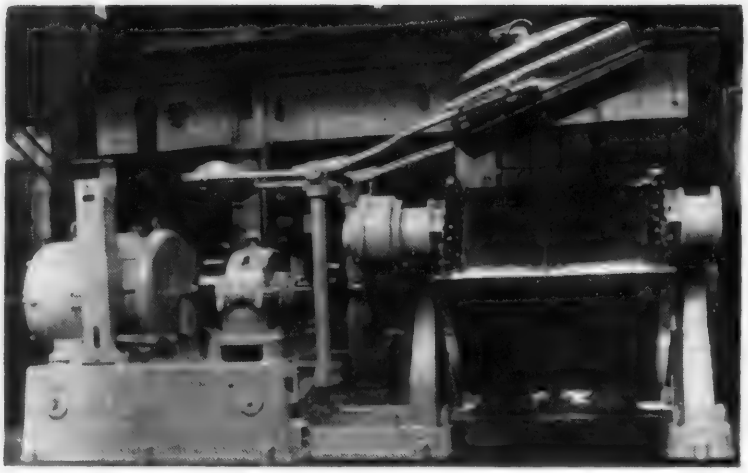
■

We regret to announce that Major James Sidney Mason, chairman of Brand and Co., Ltd., died on September 24 after a very short illness.

Major Mason had been connected with the company for fifty-nine years. He was appointed managing director in 1923 and chairman in 1937. The chief of his wide and varied interests, apart from business, lay in polo, and he had been President of the County Polo Association since 1930.



Cod liver pumping diagram.



The No. 7 Duplex mixer of approximately 135 gal. capacity.

Mixing Machinery

Original makers of the air pressure whisk which mixes under air pressure and turns out a sponge or swiss roll, the Morton Machine Co., Ltd., commenced business some eighty years ago in a little shed in Wishaw. Careful designing and engineering are evident in their products which range from a table model three-speed machine and power whisks, the Gridlap, dough brakes and handarms to the large No. 7 Duplex mixer of approximately 135 gal. capacity. Certain of the larger Duplex and handarm mixers are also being used extensively in the paint and plastic trades.

Strapping Irregular Shaped Packages

Designed to meet the need for a method of securing packages of irregular shape and size, the packaging tape manufactured in the Netherlands and distributed in this country by John Gosheron and Co., Ltd., is easy to handle, having ample "give" without actual stretch. It conforms readily to the shape of the package, has a guaranteed tensile strength exceeding 70 lb., and a breaking strain of more than 300 lb. Fixing is managed by means of a rustproof centre link and a hand punch. The strip can be printed with the user's brand name, etc., thus combining advertisement value with a practical means of bundling, tying, and strapping.

Help Yourself Food Cabinet

Based on the latest methods of mirror reflection, so that the goods displayed in the containers can be seen, the frozen food cabinets manufactured by Le Bryan Group Products (Great Britain), Ltd., have the facility of "help-yourself" shelves without interference of sliding glass lids. These containers, which have built-in fluorescent lighting, are capable of maintaining a temperature of zero degrees with a plus or minus of 5 degrees when outside temperatures are high. The refrigeration unit is, in the case of the 900 lb. locker, fitted away from the cabinet display in a cellar. In the case of the 200 lb. frozen locker, the unit is contained within the cabinet as a self-contained unit.

Tableting Machines

Models introduced during the year by Manesty Machines, Ltd., include a tablet compressing machine producing up to 5,100 tablets of ¼ in. to ¾ in. diameter per hour. The tablets can be round, square, lozenge, triangular or otherwise designed and can also be produced with a hole in the centre. Another tablet compressing machine for small tablets up to ½ in. maximum diameter and a hand tablet machine for small batches or experimental work have also been introduced. Incorporating a stainless steel hopper, with new type hand guard, stainless steel rotor and side and end shields, the new oscillating granulator can be used with moist or dry material. Coating pan models embodying a stand specially designed to include new type gearing and lubrication are supplied in three types, while for small batches the bench coating pan is produced.

Production Outruns Distribution

The production side of the quick-freezing industry appears to be developing at a speed greater than that of the distribution side; difficulty in obtaining transportation, either by road, rail or sea, which is fast enough and suitable for quick-frozen produce, is being experienced by Scottish firms. The railway system is definitely behind the times so far as refrigerated transport is concerned, while sea transportation is even less convenient. Even where refrigerated space is available, it is not of a type which permits the maintenance of high quality of the goods so transported.

The question of expense is another problem; shippers already complain that the cost of available transport is too high and if they had to finance special transportation by paying special rates the situation would be even more difficult.

Sweetened Fat

Sweetened fat (formerly known as bakery cream) may now be used in all types of food manufacture. Hitherto its sale has been restricted to the bakery trade.

Appointments

Mr. M. C. MacNulty has joined the staff of Bamag, Ltd., chemical engineers, as head of their drying department. Problems connected with the drying of farm crops are one of Mr. MacNulty's special fields of experience.

▪

Mr. Vic Gardner has been appointed publicity and sales production manager to Benjamin Electric, Ltd.

▪

Sir Weldon Dalrymple-Champneys, Bt., M.A., D.M., F.R.C.P., D.P.H., took office as chairman of the Council of the Royal Sanitary Institute on October 1, 1948.

▪

The appointment of Mr. A. S. Phillips as personnel manager at their Acton factory has been announced by T. Wall and Sons, Ltd.

Mr. Phillips joined the Unilever organisation at Port Sunlight in 1938. After demobilisation from the R.N.V.R., in which he served from 1940-1946, he studied personnel management in Belgium and the Netherlands under the Unilever Management Trainee Scheme. As well as working in factories in the Low Countries, Mr. Phillips gained first-hand experience of personnel relations in coal-mines and blast furnaces. He has also held posts with Unilever Exports, Ltd., and British Oil and Cake Mills.

▪

The appointment has been announced of Mr. Harold Elliott, M.Inst.T., general manager of Hay's Wharf Cartage Co., Pickfords, Ltd., and Carter Paterson and Co., Ltd., as Chief Officer (Freight) to the Road Transport Executive. Mr. Elliott is well known as a vice-chairman of the Meat Transport Organisation, Ltd.

New House Magazine

The first number of *Wall's Magazine*, which is to appear quarterly, has been circulated among the employees of T. Wall and Sons, Ltd.

The cover of this issue shows the shop in Jermyn Street, London, where Wall's began to make sausages in 1834. Contributions are from members of the staff only and there is a message from the chairman, Mr. Cecil W. Rodd.

George Borwick and Sons, Ltd.

The Hon. Robert Borwick, M.C., has joined the board of directors of George Borwick and Sons, Ltd. He is the eldest son of Lord Borwick, the present chairman of the company, which is now in its one hundred and seventh year.

Clarifying Contaminated Coolant

A variation of their magnetic filter, the clarifier produced by Philips Electrical, Ltd., consists of a small restricted channel into which contaminated coolant is gravity fed, where it flows past a slowly revolving aluminium disc, driven by a small electric motor. Near its periphery this disc carries a series of powerful permanent magnets and as these pass through the fluid they collect the ferrous sludge suspended in it and lift it out of the tank. The magnets are cleaned by wipers which sweep the sludge *via* a chute into the sludge-containers. The filtered coolant then passes on to the grinding or honing machine.

Golden Wedding

Mr. W. B. Kelly, who has been on the staff of W. J. Bush and Co., Ltd., for over sixty-two years, was the recipient of a special presentation from the directors and staff on September 14, on the occasion of his Golden Wedding.

Musgrave and Co., Ltd.

The telephone number of the Newcastle-upon-Tyne branch of Musgrave and Co., Ltd., is now Newcastle-upon-Tyne 26311.

Containers help Fish Freshness

A more hygienic and suitable container for the handling and conveyance of fish has been introduced at North Shields Fish Quay. The material used for the new containers is an aluminium alloy, non-corrodible and non-toxic. Low in weight, they are shock resistant against severe handling and are completely non-absorbent. Immediately after use, the lining is taken out and washed, and the containers sterilised for re-use.

British Bakers' Institute

OUTLINE OF FUTURE POLICY

The Institute's desire not to clash with existing trade organisations but rather to work with them towards the advancement of the craft of bakery was stressed by the secretary, Major W. Rees Jones, at the annual general meeting of the Institute of British Bakers held recently.

In order to prevent untrained persons holding key positions in the production of food prepared by the baker and confectioner, the Institute is now registering all *bona fide* bakers and confectioners who have attained a required standard. This should encourage the fixing of standards of quality for all bakery and confectionery products and will aim at promoting legislation which will insist on qualified men being in charge of bakery production.

At present the Institute has three sub-committees dealing with important problems, one of the most important of which is that of the growing tendency towards factory production of bread and the gradual elimination of the need of the craftsman. The Education Sub-committee is keeping a watchful eye on general schemes of education operating in the trade and is working on the definition of the standards required for competition work and the preparation of a model schedule and set of rules for bread and confectionery competitions.

Since it has resumed its functions, the Technical Research Committee has been studying the application of H.F. heating to bakeries and is about to start an intensive investigation on the progress of its development. In addition to studying the work of the Institute's own specialists, it is hoped to co-operate with various research bodies connected with the trade; bakery institutes in other countries will be consulted, and the aid of technical experts in the various bakery schools is being invited.

The third sub-committee, the Law and Parliamentary Committee, has fully investigated the need for licensing bakeries.

A Dodge 2-3 ton delivery van, with a load capacity of 470 cu.ft.

Motor Transport Exhibits

A diesel truck chassis, dropside lorries, and tippers were displayed by Dodge Brothers (Britain), Ltd., at the recent Commercial Motor Transport Exhibition. Also shown was a 2-3 ton delivery van with a load capacity of 470 cubic feet and an engine embodying many features which commend it for hard trucking work. These include direct water spray to exhaust valve seats, constant pressure lubrication by rotor-type pump, double fuel filtration, and downdraught carburettor with adjustable accelerating pump and large capacity oil bath air cleaner.

Custard Powder from the Sea

Custard powder made from seaweed was among the products shown to Mr. Tom Fraser, Under Secretary for Scotland, and Lord Morrison when they visited a Scottish factory at Orasay, South Uist, recently.

Forty men are employed in the factory, turning out 16 tons a week of dried and milled weed which is then sent to the mainland factories for processing.

Over 6,000 tons of seaweed have been gathered for the factory in the last year by crofters of South Uist.

Change of Premises

The address of Wallace and Clark, analysts and consulting chemists, is now 39, Lansdowne Crescent, Glasgow, N.W. Telephone: Kelvin 1768.

A Pioneer of Welfare

For over thirty years an advocate of improved human relations in British industry and director of the Industrial Welfare Society since its inception, Mr. Robert R. Hyde was entertained by friends to lunch on September 7, his seventieth birthday.

The story of how, with help from the present King, Mr. Hyde put industrial welfare on the map in this country so that today almost every undertaking of note has its personnel and welfare organisation, has been told by Mr. Seebohm Rowntree.

When, after World War I, Mr. Hyde formed the present Industrial Welfare Society, "he was fortunate enough," Mr. Rowntree has recorded, "to persuade the then Duke of York to become its President. It is difficult to say, when you are comparing a King and the director of this Society, which to mention first, but it is certain that this Society could never have been what it is today without Mr. Hyde; and I think he will agree with me that it would not have been what it is if it had not been for the fact that the Duke was persuaded to take part in its work, not just in a formal way, but as a person deeply interested in that work. He visited factories with Mr. Hyde; he met many employers and trade union leaders and spent days each year at his camp. It was these two men, therefore, who were primarily responsible for the extraordinary success which has attended the development of the welfare movement."

Packaging Conference at Birmingham

Following the Packaging Conference held in London earlier this year, Boxfoldia, Ltd., held a second conference in Birmingham on September 28 when Mrs. C. M. Wakeman, M.Sc., spoke again on "The Carton and the Chemist" and Mr. Norbert Dutton, F.S.I.A., on "The Designer's Function."

The Right Worshipful the Lord Mayor of Birmingham, Alderman J. C. Burman, J.P., welcomed the guests at the opening of the conference.

Plans for Tastier Whale Meat

An auxiliary whaler, the s.s. *Southern Raven*, is to be sent with a whaling expedition to the Antarctic this winter for testing a new method of preserving the tasty flavour of fresh whale meat. The meat, which will be cut into 150 lb. and 50 lb. blocks, will then be frozen and wrapped in transparent film called Alkathene and Pliofilm, completely sealing the meat and allowing no moisture to escape.

1949 Catalogue for the B.I.F.

The catalogue of the London Section of the British Industries Fair will be published, as usual, with an advance edition for distribution exclusively to trade buyers overseas, who are known to be interested in the Fair.

The demand for the catalogue, both as a guide to the Fair and as a trade directory during the year, is considerably in excess of supplies available. In view of the particular value of the advance edition in influencing buyers to visit the Fair, the Export Promotion Department of the Board of Trade has made special arrangements this year for publication in January instead of March, so that supplies may reach more distant countries in good time, thus enabling buyers to study the catalogue during their journey to this country.

New Offices

The laboratory and offices of E. R. Bolton, analysts and technical chemists, are now at 161/165, Rosebery Avenue, London, E.C.1. Telephone: Terminus 2266.

Booklets Received

An announcement of the establishment of the Metal Box Co. of East Africa, Ltd., is contained in an illustrated booklet recently produced by the parent company. The new company will operate factories at Dar es Salaam and Thika; its head office will be at Nairobi. The booklet sets out the aims of the new company and includes some biographical notes on the qualified personnel who will form the nucleus of the staff.

*

A comprehensive booklet dealing with the design of hydraulic installations and detailing their engineered hydraulic, mechanical, and pneumatic leathers has recently been produced by J. H. Fenner and Co., Ltd.

*

Spray drying, the process that leads from solution to powder in one short step, is the subject of *Bulletin No.* 112 just published by George Scott and Son (London), Ltd. Well illustrated throughout, the bulletin includes some notes on the principles of the process and the arrangement of driers together with a general specification of spray driers made by the company. Mention is also made of the company's experimental and research service.

*

First issued in October, 1899, *Progress*, the house journal of Lever Brothers and Unilever, Ltd., was published three times a year before the war. Publication of this magazine is now being resumed and the first post-war copy, copiously illustrated, contains some interesting articles on the Unilever organisation, factories of the future, and a discussion by Sir Geoffrey Heyworth, chairman of Unilever, on eastern problems.

*

A comprehensive work of reference to the products of its members, the current edition of the handbook of the British Engineers' Association sets out the objects and activities of the organisation and details the specialised engineering services carried out. Members are listed alphabetically together with their addresses and manufactures, and the book concludes with a classification of members' products by trade headings.

OBITER DICTA

● "Kipper sur Toast" and "Corned Beef Froid."—*Restaurant menu.*

● I've been in a sticky business all my life. And the stickier it got, the closer I stuck to it.—*Lord Mackintosh.*

● Conventional soil culture offers us filth instead of food. We have asked for bread and been doled out disease.—*Dr. B. W. Gonin.*

● The old people are living longer than they used to live under Conservative Governments. No one goes hungry in Britain today.—*Mr. Sparks, M.P.*

● I saw a baker's roundsman drop a loaf in a wet road, pick it up, wipe it on the side of his trousers, and put it back into his basket for delivery.—*A Surrey doctor.*

● There is nothing more disappointing than for a man to be given points and for him then to find that they are not honoured. He becomes dejected and begins to lose faith in the country.—*Mr. Gerald Williams, M.P.*

● If the bacteriologist is honest, he will agree with me, and say without hesitation or fear of contradiction that it is more risky to kiss a dainty damsel at the dance than to drink a glass of milk in a dirty dairy.—*Correspondent to the "Carmarthen Journal."*

● I want to refer to a point which affects farmers very seriously, and that is the fact that the Minister of Food will not go out into the world and buy feedingstuffs. He is making contracts all over the world to bring back to this country the manufactured article. If the Minister of Food has a motto, it must be "Every country but mine own."—*Mr. Baldwin, M.P.*

● How on earth does the Hon. Lady believe that a farm labourer can be nourished and can enjoy a midday packed meal, after working five hours in the fields and probably cycling three or four miles to get there, on a sandwich filled with cold spaghetti? I would like to see the Hon. Lady herself at the end of a week's harvesting on rations such as that.—*Mr. Joynson-Hicks, M.P.*

Company News

At the annual general meeting of British Glues and Chemicals, Ltd., held in London recently, the chairman revealed that the group's policy in the past year had been to secure greater efficiency through increased mechanisation and improved processes, and that the subsidiary companies had made the main contribution to the group's increased turnover. B. Young and Co., Ltd., had continued its advance in technique and made notable additions to plant and process, while Calfos, Ltd., was developing a useful export trade in pharmaceutical products and food preparations.

*

The completion of negotiations for the purchase from the Government of the penicillin factory at Speke, Liverpool, was mentioned by the chairman, Mr. Henry J. Ross, at the seventy-first annual general meeting of The Distillers Co., Ltd. This transaction was followed by the formation of The Distillers Co. (Biochemicals), Ltd., and a high grade of crystalline penicillin was now being marketed by the company.

In order to ensure the earliest possible production at their grain distilleries, it had been decided to reopen the Caledonian distillery which had been silent since 1941. Permission had not yet been granted by the authorities to proceed with a new yeast factory in the South of England, but it was hoped that a start on erection would be allowed within a reasonable period. Careful consideration to the extension of research and development had been given and a substantial sum had been appropriated for this purpose.

Having regard to the heavy expansion programme authorised, the board had made a small reduction in the payment of a dividend on the ordinary stock for the year of 1s. 1½d. per unit of 4s., as compared with 1s. per unit for the previous ten and a half-month period.

*

At a recent board meeting of L. Rose and Co., Ltd., the directors declared a dividend on the ordinary shares of the company for the six months ended June 30, 1948, at the rate of 6d. per share, less income tax.

News from Overseas

Italian Tomato Extracts

The heartening effect on Italian producers of the news of proposed British purchases of 10,000 tons of tomato extracts has been somewhat subdued by the fact that British authorities have stipulated that such extracts should not contain more than 50 parts of copper to one million parts of extract. Since most Italian manufacturers boil their tomatoes in copper cauldrons, exporters are having difficulty in finding sufficient extract with such a low content of copper.

Gas-packaging of Food

A new package, called Flex-Vac, made of thin gauge aluminium foil laminated to Cellophane and bleached kraft paper, is being used for the gas-packaging of peanuts. After the peanuts are roasted, blanched, cooked, evacuated, and salted, they are put into the bags. These are prepared for heat sealing and put in a vacuum chamber which is drawn to about 28½ in. of vacuum. Nitrogen under pressure is entered into the chamber, and the bags are then heat sealed.

The new package is moisture, grease, insect, and dust proof, while protecting against chemical change or deterioration. Other development work on the gas-packaging of bacon, frankfurters, cheese, coffee, and frozen fish is being carried out.

Mellon Institute

A noteworthy occurrence mentioned in the thirty-fifth annual report of the Mellon Institute is the establishment of a Department of Research in Physical Chemistry which will conduct fundamental investigations in this field for professional and public benefit. Investigations in the Department of Research and Pure Chemistry have dealt with the application of organic chemistry to problems in biology, chemotherapy, and medicine, while the Department of Research in Chemical Physics, now in its second year, has seen its facilities further completed and its programme of fundamental studies firmly initiated.

Among the accomplishments in continued industrial fellowship research programmes may be mentioned the development of a new method for neutralising waste pickle liquor that has several advantages over conventional practice, the industrial application of soybean and soybean protein derivatives and of a variety of chemicals derived from corn, and an improvement in bread baking which has been brought about by utilising the unique surface characteristics of an organosilicon resin. Bread pans treated with this resin require no greasing and allow up to 200 bakings without further treatment.

Molasses Production in South Africa

Yielded entirely by sugar cane, South African molasses is produced solely in the Province of Natal. It is loaded into tankcars in Natal and transported by rail to Durban where it is shipped.

In former years the internal demand for molasses was very limited, virtually the only consumers being manufacturers of alcohol. Recently, however, there have been large developments in the field of chemical industries requiring molasses as a raw material, while considerable expansion has taken place in the spirit industry.

Tankers used for conveying molasses on the South African railways.

Tinplate Shortage

Poultry farmers in Victoria are expressing concern about their probable inability to export additional quantities of food in the form of canned chicken because of the acute shortage of tinplate. Australian representatives abroad have been seeking additional supplies, but so far there has been no indication that these will be obtained, or obtained in time to avoid the loss of foods which could be exported.

Lack of tinplate may interfere with plans to increase Australian food exports. The sale of produce to canneries is the principal activity of some Australian farmers, and to others it is a valuable sideline which helps to make their total production for a season profitable. A farmer who is deprived of part of his market may change over to farming of a different kind, and if this happened on a large scale it could reduce the export surplus of some of the products most desired.

Italian Sweets Industry

At a meeting held recently in Rome for the formulation of a policy for the promotion of the Italian confectionery industry, Dr. Ferrante, Counsellor of the Motta Company, stated that the chief problem was the supply of sugar. The Italian government, anxious to protect the local production of sugar, imposed upon imported sugar much heavier duties than it did upon the finished confectioneries imported from abroad. Dr. Ferrante asserted that Italian producers would never get as much or as good quality sugar beet as was produced abroad and that, in addition to its high cost, sugar manufacture at home involved the importation of greater quantities of foreign coal.

If local sugar production disappeared, the areas at present used for sugar beet production could be assigned to other cultures that could be exported and the Italian sweets and confectionery industry would get sugar at a much lower price which would enable an increase in its exports.

Hot Dogs

An automatic machine supplying hot meat sandwiches to customers as and when they should happen to pass has been put on the market by "Dog in a Kennel" Inc. The sandwiches are packaged by the machine operators and placed in the chutes for heating, where they are maintained at approximately 140° F. The

cabinet of the machine is steam heated by a water tank at the bottom of the machine, which is heated by a thermostatically controlled electric immersion heater. The machine holds fifty sandwiches, fifteen in each chute and twenty in reserve. It can also be used for serving tamalos, fried chicken, hamburgers, etc.

Cotton for Cheese Wrapping

The cheese industry has wrapped around itself a great deal of cotton in the last few years, according to a report in the New York Journal of Commerce. Latest figures show that the nation's cheese makers have doubled their consumption of cotton, and now use over a million pounds of cotton a year for wrapping cheese.

Industrial Uses for Farm Crops

CHEMURGIC RESEARCH IN U.S.A.

Operated by the Bureau of Agricultural and Industrial Chemistry of the U.S. Department of Agriculture, four regional laboratories which were primarily established for research into industrial outlets for farm crops have made important contributions in the chemurgic field.

Research at the laboratories, as well as at a number of smaller centres throughout the country, has concentrated on the following categories: maize, wheat and other cereals; soybeans and oilseed crops; waste products such as straws and stalks; cotton; sweet potatoes; peanuts; tobacco; apples and other fruits; milk products; vegetables; animal fats and oils; alfalfa and poultry by-products.

In the northern laboratory scientists have substantially increased the yield of penicillin. Their process involves feeding the mould that produces penicillin on a diet mainly composed of maize steeping liquor (a by-product of the manufacture of cornstarch) and lactose or milk of sugar.

Research in the western laboratory has led recently to two important findings in connexion with the canning of asparagus and pears. It has been found that some of the asparagus juice wasted in canning could be used in the production of subtilin, a new drug which destroys germs, while the woody and pulpy asparagus butts, also a waste, could be made into plastics. It is believed that subtilin has uses in the treatment of bovine mastitis, trichomoniasis, certain types of ulcers and tuberculosis. The juice wasted in pear canning can also be used in the making of subtilin and, in addition, in the production of a food yeast containing protein. At present, production of subtilin and food yeast is in the experimental stage.

In the eastern laboratory scientists are using buckwheat to produce a drug called rutin, extracted from the leaves and blossoms of the green plant, which strengthens weak capillary blood vessels and helps prevent certain types of haemorrhages.

Many problems are involved in achieving wide-scale industrial production from farm crops, but it is felt, nevertheless, that chemurgic research has more than justified the expense involved and is leading toward increased use of farm products in industry.

Pineapple for Britain

Two hundred and fifty-eight thousand cases of canned pineapple is the season's total packing production from Queensland's bumper summer crop this year. Although big shipments are being made to Canada, most of the winter pack is to be offered to Great Britain.

Colonial Agricultural Research

Dr. G. A. C. Herklots, recently Secretary for Development in Hong Kong, has been appointed Secretary for Colonial Agricultural Research and Secretary to the Committee for Colonial Agricultural, Animal Health, and Forestry Research. He succeeds Dr. H. H. Storey, C.M.G., F.R.S., who has been appointed Deputy Director of the East Africa Agriculture and Forestry Research Organisation.

Refrigeration Unit for Vehicles

Known as the Frostrode, a new mechanical refrigeration unit for food transport and trailer bodies has been designed for installation on the outside of the vehicle body, at the front.

The complete outfit weighs 825 lb., and has a capacity of 24,000 B.T.U. per hour, equivalent to 2 tons of ice every twenty-four hours. The principal elements consist of a 10 h.p. Onan two-cylindered air-cooled petrol engine, which drives a 5 h.p. six-cylindered compressor and a complete set of automatic thermostatically operated controls. An outstanding feature of this new unit is that only the evaporator coils and air-circulation fans protrude inside the vehicle body, and these require only 7·2 cubic feet of space. Operation can be made in reverse cycle, permitting fast defrosting in roughly fifteen minutes.

Copenhagen Exhibition

BRITISH GOODS PROMINENT

Organised by the British Import Union of Denmark in collaboration with the Federation of British Industries and with the approval of the British and Danish Governments, a British Exhibition was held in Copenhagen from September 18 to October 3. The exhibition was located in five different places in the city, including two specially constructed buildings, and more than 1,100 British manufacturers took part.

Machinery, chemical products, and building material on view in the Forum included a wide variety of engineering products, an exhibition of gauges and tools organised by the F.B.I., and examples of recent developments such as industrial gas turbines and platform trucks. Among the products exhibited for the first time in Denmark were the latest designs of lathes and drilling machines, automatic temperature control devices, power presses, and a comprehensive range of refrigerating equipment, the first display ever staged outside Britain on behalf of the British refrigeration industry.

Commercial vehicles, including a number of new models and a general purpose vehicle which could be used not only for travelling but also for electricity generating and operating a portable milking apparatus, were exhibited in the Royal Riding House.

Office appliances, foodstuffs, and further examples of metal and engineering products were housed in the Tivoli, where the Board of Trade and the British Council had their headquarters, while at the Gutenberghus five floors were devoted to the exhibition, two floors containing a display of scientific instruments, including a wide range of precision instruments.

Margarine can be Stored for 1½ Years

Studies completed by an American firm show that margarines containing animal fats or soya oil can be stored at 5° F. and −10° F. for one and a half years without change in colour, texture, and flavour. After extended storage at the low temperatures, no tallowy flavour or greenish colour appeared, nor was there any apparent salting out in any of the samples.

Hydrolysed protein, autolysed yeast extract, citral, carotene and chlorophyll were exhibited by Fredk. Boehm, Ltd.

Metals in Foodstuffs

The flavour and digestibility of processed foods can be improved by removal of microscopic traces of metals that hasten deterioration, according to John P. Thompson, chief of the chemical branch of the Quartermaster Food and Container Institute of the Armed Forces, Chicago, Illinois, in a report to the American Chemical Society.

Asserting that off-colours, off-flavours, and rancidity, perennial problems for producers of canned and packaged foods, can be caused by as little as one part per million of copper, iron, or other metals, Mr. Thompson explains that the metals act as catalysts. Chemists at the Institute found that minute traces of copper and iron in cardboard packages made biscuits rancid, and that copper in the protein of milk accelerated deterioration of dried whole milk.

Nigerian Livestock Mission

A mission to visit West Africa to investigate the livestock industry in Nigeria and the Cameroons under British Mandate, with particular reference to meat production, has been appointed.

The leader of the mission, which will also engage in discussion where necessary with the authorities of the neighbouring French territories on problems of mutual interest, is Sir Frank Ware, C.I.E., F.R.C.V.S., formerly Animal Husbandry Commissioner to the Government of India, and the members are Mr. Thomas Shaw, a director of Zwanenberg-Organon, Ltd., and Mr. Gilbert Colville, who has special experience in the breeding-up of African cattle. Arrangements are being made for local officers of the Veterinary, Agricultural, and Geological Departments to be attached to the mission.

The mission left for Nigeria early in October for six or seven weeks and will probably pay a further visit to the country in February or March to see the country and the cattle at the end of the dry season. During their first visit they will spend a few days in the Gold Coast at the invitation of the Gold Coast Government to discuss with them problems in connexion with the cattle industry there.

News from the Ministries

Glucose Prices

The Glucose (Control and Maximum Prices) Order, 1948, has been made to replace the Glucose (Control and Maximum Prices) Order, 1943, as amended.

The new Order, which came into effect on October 10, provides for an increase of 14s. per cwt. in the first hand selling price of liquid glucose following the recent increases in the prices charged to glucose manufacturers for maize and maize starch.

Tea from China

The Tea (Prices) Order, 1948, has been made to replace the Tea (Prices) Order, 1947.

The new Order, which came into force on September 19, provides for the removal of price control from pure China and pure Formosa teas. This will enable finer quality China teas to be offered to the public than has been possible since before the war. It will be some weeks before pure China and pure Formosa teas are on sale and at first supplies will be limited. They will be sold as part of the ordinary tea ration and will have to be labelled "Pure China" or "Pure Formosa."

Pulp Imports for Preserves

Arrangements have been made, in agreement with the Board of Trade, for the importation from South Africa, before the end of 1948, of a limited quantity of Youngberry pulp and Cape Gooseberry pulp to be used solely for the manufacture of preserves.

Applications for import licences, which should be supported by evidence of firm orders from jam manufacturers, should be submitted in the first instance to the Ministry of Food, Import Section, Carlton Hotel, Pall Mall, London, S.W.1.

Copies of the appropriate forms of application (Form ILD/A) may be obtained from the Board of Trade, Import Licensing Department, 189, Regent Street, London, W.1, from the usual Customs Offices, or from the Ministry at the above address.

Licences for Fish Frying

It has been announced that, in order to increase the production and widen the distribution of fish and chips and also to promote increased competition in the fish frying trade, licences to open new fish frying businesses or to operate mobile fish frying units will, for the present, be granted freely to applicants provided that:

(*a*) the application is in respect of a new, *bona fide* fish-frying business, or new shop or retail outlet serving new customers and owned by an existing business;

(*b*) the applicant can show that he will be able to obtain suitable premises and equipment and begin to operate his business as a fish frier within 28 days from the grant of the licence; and

(*c*) the applicant has not had a food licence revoked or committed any serious food offences.

Imports of Tomato Purée

Applications from *bona fide* traders will be considered for licences to import canned tomato purée paste or concentrate (other than in dried form) from Portugal.

The issue of licences will be subject to prices and other conditions being considered satisfactory.

Applicants are warned not to allow shipments to be made until they have received an import licence from the Board of Trade.

Applications on Form ILD/A (in duplicate), which can be obtained from the Board of Trade, Import Licensing Department, 189, Regent Street, London, W.1, and from the usual Customs Offices, should be addressed to Canned Fruit and Vegetables Division, Ministry of Food, 8, Sussex Place, Regent's Park, N.W.1.

Lemons Freed from Control

Immediate steps are to be taken to remove the control on the price of lemons and to return the responsibility for importation to the private trade. The Ministry of Food is accordingly ceasing to act as importer and distributor of lemons. The new Order came into force on October 10.

Wheat Commission

The Minister of Agriculture and Fisheries and the Secretaries of State for Scotland and the Home Department have appointed Mr. William Gleadel Barber of R. Silcock and Sons, Ltd., and Mr. L. Hector Read of the City Flour Mills, Norwich, to be members of the Wheat Commission representing the interests of importers of wheat by-products and millers of flour respectively.

Australian Meat Agreement

Agreement has now been reached in London between the Minister of Food and the Australian Commonwealth Government on the prices which are to be paid for frozen beef, mutton, lamb, pig meats, and offals shipped to this country during the year commencing October 1 under the bulk purchase agreement.

The revised prices represent an overall increase on the prices paid under the first bulk purchase in line with that recently agreed with the New Zealand Government.

Belgian Silverskin Onions

Arrangements have been made in agreement with the President of the Board of Trade for the importation under licence during the period ending November 14, 1948, of a limited quantity of silverskin onions (dry-bulb) to be used for manufacturing purposes.

Applications will be considered from *bona fide* importers of fresh fruit and vegetables and should be supported by firm offers of business from the Belgian supplier. They should be submitted in the first instance to the Ministry of Food, Fresh Fruit and Vegetables Division, Import Section, Carlton Hotel, Pall Mall, London, S.W.1. Importers will be required to give an undertaking that the onions will be sold or used for manufacturing purposes only.

Copies of the appropriate forms of application (Form ILD/A) may be obtained from the Board of Trade, Import Licensing Department, 189, Regent Street, London, W.1, from the usual Customs Offices, or from the Ministry at the above address.

Disposal of Salvaged Foods

The Salvaged Goods Order, 1948, came into force on October 1, and replaced the Salvaged Goods (Terms of Sale) Order, 1945. The effect of the new Order, which includes a definition of salvaged goods, is to restore to wholesalers part of their pre-war function of disposing of such goods, while maintaining control over the disposal of rationed and controlled foods and soap and of other specified commodities listed in the schedule to the Order.

New Customs Shipping Bill

A new Customs Shipping Bill, numbered 63A (Sale), has been introduced for use where goods exported under licence are entered with the Customs before shipment *solely by reason of export licensing requirements*. Supplies of the new form may be obtained from H.M. Stationery Office or through the usual agents, but exporters and agents holding stocks of Shipping Bill No. 63 (Sale) specially over-printed for use in entering goods for shipment under export licence may continue to use these in place of the new form for a reasonable period.

Fresh Fruit and Vegetables

It has been announced that the following additions have been made to the list of items which may be imported under the open individual licensing arrangements announced earlier this year.

The additional commodities concerned which may now be imported from Spain are mandarines, tangerines, and clementines.

Grapes and fresh pimentos may also be imported from Portugal up to November 30.

Importers who already hold open licences with the prefix No. O.F.F.V., will be allowed, without amendment to their existing licences, to import both these commodities and those mentioned previously from the countries named against each commodity.

Applications by importers not already in possession of such open licences should be submitted to the Ministry of Food, Fresh Fruit and Vegetables Division, Import Section, Carlton Hotel, Pall Mall, London, S.W.1.

Export of Fish

An Open General Licence (The Export of Goods (Fish) (No. 2) Licence, 1948) has been granted by the Board of Trade, in consultation with the Ministry of Food, and continues the existing authority for the unlimited export from the United Kingdom to any destination of all kinds of fish (other than canned fish) for a further period ending March 31, 1949.

Chicory Order Revoked

An Order revoking the Chicory (Control) Order, 1942, from September 20, 1948, has been made.

The Chicory (Control) Order, 1942, was made to ensure that liquid coffee essence manufacturers received priority use of the limited supplies of dried chicory available. Owing to increased production in this country, supplies are now adequate to meet all domestic requirements and to enable small quantities to be exported. It is, therefore, no longer necessary to direct the use of chicory.

Price control remains in force.

European Recovery Programme

A number of enquiries have been received from importers as to the possibility of obtaining goods from U.S.A. under the European Recovery Programme and the procedure that should be followed to obtain such imports. The position is as follows:

The assistance afforded by the United States of America in terms of the European Recovery Programme will, it is hoped, enable the present level of imports to be maintained, but the aid is unlikely to be sufficient to warrant any easement in the present import restrictions; indeed, further reductions in the volume of imports may still prove necessary if prices of raw materials and basic foodstuffs continue to rise.

It is not proposed to alter the existing channels of procurement of imports and accordingly applications for import licences should continue to be made as heretofore to the Import Licensing Department, 189, Regent Street, London, W.1. Where it is decided that it is appropriate to obtain an item on E.R.P. terms, the importer will be so informed and will be notified of any additional formalities required. These will relate in the main to the production of evidence of shipment of a certificate from the overseas supplier and of payment to the overseas supplier so as to satisfy the U.S. Authorities that the funds made available by them have been used in the manner intended; certain stipulations regarding the marking of shipments to identify them as E.R.P. cargoes may also be necessary.

Some importers appear to suppose that an import licence will be more readily granted if they can arrange for a transaction to be financed on E.R.P. terms, but this is not the case. It is, therefore, unnecessary for firms to enquire whether goods in which they are interested are so financed or to recommend that they should be. In particular it should be appreciated that the office of the Economic Co-operation Administration in the United Kingdom is in no sense a procurement agency, and applications and enquiries regarding imports and import licences should not be directed to it.

Sugar for Bees

Because of the unfavourable weather an additional quantity of sugar not exceeding 5 lb. per colony will be made available to beekeepers to supplement the allowances for winter and spring feeding already announced.

Applications for permits should be made immediately, and in any event not later than November 30, 1948, on the official application form to be obtained from local food offices. After completion the form should be countersigned by a responsible person and returned by the applicant to the food office.

It is also announced that the special allowance made during July of 5 lb. of sugar per colony will be treated as a supplementary issue and not as an advance on the 10 lb. winter allowance as announced. Beekeepers who drew the 5 lb. advance allowance will thus be entitled to claim the full 10 lb. winter allowance as well as the present additional 5 lb. per colony.

Beekeepers are reminded that they may, if they wish, draw the spring allowance of 5 lb. with the winter allowance.

Information and Advice

Mango Chutney

B.2705. *We have some Jamaica mangoes in thick syrup and would like to know how to make mango chutney.* (Northumberland.)

We have always understood that mango chutney was not made up in this country, but is purchased in bulk from India, Ceylon, West Indies, etc., and is bottled in Britain. Most large firms put up a mango chutney in this way. However, the purchased cooked material is often diluted with apple or other pulp to form various well-known brands of chutney.

Perhaps the following recipe might be useful for a mixed product:

Fifty lb. mango chutney is taken as received in casks and mixed with an equal quantity of the following chutney:

Water	2¼ gal.
5 per cent. gum tragacanth in malt vinegar	1½ gal.
Beet, carrots, or turnips, or mixture of these	25 lb.
Onions (not necessary, but important for flavour)	10 lb.
80 per cent. acetic acid	2 lb.
Caramel	5 oz.
Salt (unless brined vegetable is used)	2½ lb.
Ground ginger	4 oz.
Ground cayenne	2 oz.
Ground paprika	3 oz.
Ground cinnamon	3 oz.
Ground pimentos	2½ oz.
Cloves	1 oz.

The chopped or minced vegetable is boiled with the water until soft and is given a further simmering for ten to fifteen minutes with the rest of the ingredients except the acetic acid. The latter is added at the end of the simmering, and after a thorough mixing the mixture (enough for two 50 lb. batches of mango) is ready for combining with the mango chutney.

Brined Onions

B.2754. *In May we put some onions into brine with the skins on, and in July these were taken out of the brine, peeled, washed in two or three changes of water and put into a 6 per cent. acetic vinegar in casks with the heads on. They have remained in the casks now about three weeks but "gassing" cannot be prevented. The first brine strength was 50° Salometer and the second brine (after 14 days) was 75° Salometer. Can you give us any assistance, please?* (Yorks.)

Judging from the information you give the brining was not at fault in this instance, and we can only ascribe the gassing to too weak an acidity in the acid treatment following brining.

Six per cent. acetic solution as used would be quite satisfactory provided the ratio between the weights of liquid and the onions was such as to give an equilibrium minimum figure of 3½ per cent., but we imagine that too many onions were steeped in too little 6 per cent. acetic.

Information Supplied

B.2788. *Machinery for the production of potato crisps.* (London.)

B.2789. *Suppliers of Cellophane coffee bags.* (Nigeria.)

B.2790. *Manufacturers of small mixers.* (Middlesex.)

B.2794. *Machinery for the manufacture of tapioca and shellac.* (London.)

B.2796. *Suppliers of machinery for the packing of potato crisps.* (Lancs.)

B.2797. *Suppliers of plastic cups for use in factory canteens.* (Lincs.)

B.2799. *Suppliers of a machine for topping, tailing, and peeling onions for pickling.* (New Zealand.)

B.2801. *Suppliers of poly-galactose-xylose.* (Middlesex.)

B.2818. *Literature on synthetic flavours and essences.* (London.)

B.2820. *Literature on apple pectin manufacture.* (Norway.)

B.2821. *Canning literature.* (Staffs.)

B.2825. *Manufacturers of sieving machinery.* (London.)

B.2830. *Suppliers of carob juice.* (Glam.)

B.2832. *Firms who make and repair biscuit cutters.* (Mauritius.)

B.2833. *Names and addresses of manufacturers of olive oil and teaseed oil.* (Lancs.)

B.2837. *Suppliers of olive oil.* (Northumberland.)

B.2848. *Suppliers of machinery for making ice cream cups.* (India.)

B.2851. *Suppliers of Bentonite for the clarification of vinegar.* (India.)

B.2852. *Manufacturers of a hand-operated rissole cutter.* (Lancs.)

B.2854. *Materials which could be used as substitutes for sugar in the preparation of sauces.* (Warwicks.)

B.2855. *Suppliers of a raising ingredient for use in the manufacture of self-raising flour.* (Durham.)

B.2860. *Manufacturers of canning machinery.* (Denbigh.)

B.2864. *Suppliers of automatic packing machinery for margarine.* (Surrey.)

B.2866. *Suppliers of carob juice.* (Durham.)

B.2869. *Machinery for weighing, packing, wrapping, and bottling.* (Eire.)

B.2871. *Albumen suppliers.* (London.)

B.2873. *Manufacturers of vermicelli.* (Yorks.)

B.2875. *Suppliers of plant for puffing wheat.* (Bucks.)

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

605,425. PACKMAN, P. J., and MORRISON, P. H.: Cheese curd testing apparatus.

605,478. PEHRSON, J. M., and PEHRSON, R. V.: Drying of vegetable or other matter.

605,625. AKTIESELSKABET GRINDSTEDVAERKET: Agents for treating the surface of cheese.

605,700. NEWSOM, K. K.: Drying of fruit and vegetables.

Abstract of a Recent Specification

The Preservation of Food

This invention relates to a method for the preservation of various food materials, and products resulting from such method. More particularly the invention relates to a method serving to sterilise food materials in such a manner as to prevent spoilage by growth of micro-organisms like mould, bacteria, or yeasts.

It is an object of the invention to provide a method for preserving food products in sterilised condition and marketable form, without relying upon the use of heat as a sterilising agent and without the permanent incorporation of chemical preservatives.

Other objects are to provide a novel method making use of certain chemical sterilising agents which are highly volatile at atmospheric pressure and room temperature, particularly agents which can be termed bactericidal and fungicidal fumigants which serve to kill micro-organisms present on or in the commodity; to provide a method of the above character which although it makes use of a chemical agent to kill micro-organisms does not leave any residue on the commodity or form reaction products with the ingredients of the product; and to provide a novel method enabling the introduction of small measured amounts of the highly volatile agent into containers.

The food material is sterilised by the action of a highly volatile bactericidal and fungicidal fumigant, after the food material has been introduced into the containers and after the containers have been sealed. The containers employed for this method are not completely gas-tight as compared with the sealed tin cans or glass jars at present commonly used, and particularly they are pervious to the volatile agent employed. In this way the sterilising treatment is confined to a temporary period of time, which time is insufficient to allow the formation of objectionable reaction products.

One type of container used with good results is a bag formed entirely of a moisture-proof film.

While containers of the bag type are preferred, more permanent containers such as glass jars or cans can be used, provided the container is supplied with a wall or window formed of material permeable to the sterilising medium but which will not permit entrance of micro-organisms.

The bactericidal and fungicidal fumigants employed are ethylene oxide, propylene oxide (a homologue of ethylene oxide), and methyl bromide, which are highly volatile at atmospheric pressure and room temperature. Because of their highly volatile character the use of such agents involves certain problems, particularly in that it is difficult to introduce small measured amounts of the same into the container before sealing. Therefore such agents are utilised in conjunction with a medium capable of lowering the vapour pressure of the same. After sealing the container at room temperature, the highly volatile sterilising agent evaporates from the solution or mixture to provide a gaseous sterilising atmosphere within the container. The gaseous sterilising agent gradually penetrates through the material of the container which is permeable thereto, so that, for example, with a moisture-proof bag, after a period of about twenty-four hours only traces remain in the container, and all traces disappear in about three days.

598,908. *Francis Karl Baerwald.*

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

KIWI. — 658,856. Canned fruits. **H. G. Kingham and Company, Limited,** The Stores, Station Road, Dorking, Surrey; Merchants.

EGG-CUSTO.—659,420. Custard powder, being an egg product for use in bakery and confectionery. **Lawrence and Hilton, Ltd.,** 481, Waterloo Road, Blackpool, Lancs; Manufacturers.

SWEET DREAMS.—659,450. Chocolate and non-medicated confectionery. **Rowntree and Company, Limited.,** The Cocoa Works, Wigginton Road, York; Manufacturers and Merchants.

HOMOTEX.—660,563. Edible oils and edible fats. **Roger Blake, Limited,** Claremont Street, Edmonton, London, N. 18; Manufacturers and Merchants.

TITHE FARM.—661,156. Dried herbs, preparations made from herbs, and preserved, dried, canned, and cooked fruits and vegetables. **Helen Lucas** and **John Landfear Holt Lucas,** trading as **R. Brooks and Co.,** 27, Maiden Lane, Covent Garden, London, W.C.2; Merchants.

MAJESTIC.—663,850. Bakers' ovens. **Sorensen Bakery Equipment, Ltd.,** Soreen Buildings, Drake Street, Manchester; Manufacturers.

New Companies

Trentside Bakeries, Limited. (454184.) Nom. cap.: £15,000 in £1 shares. Permt. gov. dir.: J. Price, 71, St. John's Street, Long Eaton. Sub.: J. J. Price, 11, Clumber Street, Long Eaton.

Vardens Products, Limited. (454253.) To carry on bus. of manufacturers of and dealers in food products, etc. Nom. cap.: £100 in 1s. shares. Dir.: L. Ashley, 5, King's Gardens, London, N.W.6; Sub.: A. V. Butzhoy, 22, Campden Hill Gardens, London, W.8. (director).

Sunnydale Products, Limited. (454521.) To carry on bus. of manufacturers of and dealers in foodstuffs and medicines, etc. Nom. cap.: £100,000 in £1 shares (50,000 "A" and 50,000 "B"). Dirs.: B. N. Reckitt, G. M. Samuelson, D. A. Webster Cumming, G. Colman Green (all "B" dirs.); E. J. Mosley, L. Bartholomew, H. Cawdron, and D. A. Hampshire (all "A" dirs.). Subs.: C. Belton and A. M. Bell (solrs.), 18, Austin Friars, London, E.C.2.

Crow Brand Products, Limited. (454998.) Wilbury Way, Hitchin. To carry on business of packers, canners, bottlers, manufacturers of and dealers in preserved, cooked, and concentrated food products, etc. Nom. cap.: £3,000 in £1 shares. Permt. dirs.: J. D. Masters, 22, Garrison Court, Hitchin; T. Nicholson, 24, Old North Road, Royston.

H. K. Thomas, Limited. (455179.) 628, Longmoor Lane, Fazakerley, Liverpool, 9. To carry on business of manufacturers of and dealers in confectionery, cooked and prepared foods, pastrycooks, etc. Nom. cap.: £2,000 in £1 shares. Dirs.: H. K. Thomas and Mrs. E. V. Thomas, 628, Longmoor Lane, Fazakerley.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.